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by Hookway, a study by Professor Wolf, University of Manchester, one cost/benefits. In the late 1960s, the subject of cost/benefits of STI programs began to get increasing attention. COSATI and its philosophies and programs were discussed by Aines. The meeting ended amicably with statements of good will and interest in working closely together.

A second meeting was held in Paris (July 16-18, 1968 with Dr. Philip Hemily, chief scientist for the U.S. mission to OECD, and his associate Mr. Carl Wait. Dr. Burton Adkinson, head of the NSF's Office of Science Information Service, also attended. Both Hemily and Wait had from their start at OECD shown considerable interest in science communications matters, hence were "a tower of strength" in working with Becker, Knox and Aines. They encouraged the U.S. Mission to provide close support in information and other matters. Adkinson told the group that he was staying over an additional week for the meeting of the ICSU-Unesco information group in Paris. The leader of that effort was Dr. Harrison Brown, Foreign Secretary, National Academy of Sciences. Asked for a personal assessment of the ICSU-Unesco information effort by Hemily, I told him that it was our philosophy and practice to work as closely as possible with Harrison Brown and his assistant Ed Rowan of NAS. I made the point that the balance of power in the information area had shifted from the professional societies and international library and documentation groups to governmental groups. The work of OECD to pull the leading technological countries into a common information orbit was an example of things to come. ICSU-Unesco would probably concentrate on helping developing countries. This was important, I pointed out, and the U.S. should devote more than lip service to this cause. In response to another question from Hemily, I said:

In my view, the OECD information effort would not reach maturity unless it became involved in important research problems, such as: water resources, pollution, population strains, urban renewal, transportation, environmental quality, marine science, etc. Information systems for problem-solving and crises management would be the next area for international attention.

Working with Phil Hemily and Carl Wait over the years had to be one of the real pleasures that I derived from my OECD efforts. Oddly, Carl Wait was a British national, at all ^{times} / a tremendous asset to the U.S. mission, popular among all of the country missions in OECD and a "can do" person with extremely high principles and intelligence. In later years, he retired from his long service with OECD, but still gets involved from time to time as a consultant to OECD. Hemily, who as a Department of State foreign officer, was simply outstanding at OECD. In recent years, he became a special consultant to the U.S. National Academy of Sciences where he is still rendering conspicuous service in international affairs.

For historical and other reasons, the author believes it fruitful to describe the kind of activities that went on in the OECD Information Policy Group, July 16-18, 1968, as depicted in the Aines' memorandum to Dr. Hornig.

Alexander King, director of the OECD science and technology program stated during his opening remarks that he has talked to the Soviet authorities responsible for VINI TI about OECD's future cooperation with the Soviet Bloc. Peter Judge, the OECD secretary for the Information Policy Group divulged that he had also spoken to Soviet authorities. The times were not right for agreements, since nothing came of the initiative. There was some sensitivity that the Canadians, British and the Americans were working together behind the scenes. There was at least a germ of truth to this allegation, but the truth of the matter was that all delegations were doing exactly the same to push through IPG/ ^{actions} that would help achieve country goals. Writing about the Excerpta Medica- National Library of Medicine disagreement, Aines wrote:

I conferred separately with Hookway, Winter and Van Dyke (both from Holland), suggesting that they refrain from any discussion about the MEDLARS and Excerpta Medica confrontation, since Cummings (NLM) has agreed to discuss the matter with Vinken (Excerpta Medica) and that we should give them the opportunity (of solving the issue.) They were delighted, Don, and cooperated beautifully. In turn, Adkinson and I agreed that the MEDLARS Coordinating Group could logically be expanded in the future to look into the international biomedical information program.

I made a presentation on what was taking place in the U.S.A. in the COSATI National Systems effort. Considerable interest of the IPG committee was evident about developments in this project. Van Dyke (Holland) announced that his country was arranging for a six-country conference on computers, refraining from telling us who they were. He also announced that a national information center on social sciences would be established by the Dutch National Academy of Sciences and that Excerpta Medica would go on line by the year's end. Dr. Cockx, the Belgian delegate, announced that his country is preparing an Information Congress for March 1969. Personally, he informed me that Excerpta Medica is "enticingly" offering free service to small countries. The Japanese representative stated that in August 1969 his country would have a new computer-based system for handling abstracting and indexing journals at the Japanese Information Center for Science and Technology. Following the lead of the biological community in the United States, the Japanese biological editors have formed an organization for interaction. Plans were being made for a National Referral Center, modelled after the one in the U.S.A. Japan had consummated an agreement with the American National Library of Medicine to assist them in formation of a MEDLARS Search Center. The Japanese announced their pride in creating a new high speed Chinese character line printer that used a flying spot CRT that could print 200-600 characters per second. John Gray (U.K.) followed this by announcing a computer-based system for physics and electrical engineering abstracts to be operational in 1969. Photo typesetting was to be used in a number of publications. The Swedish delegate (Hokkansen) announced the formation of a board for technological development, an investment corporation for technology utilization, and a Council for Scientific and Technological Communications. Cramer (Germany) announced that data of all kinds (critical, medical, social science and chemical) were getting more attention in his country. Dr. Tias (Canada) stated that his country was interested in organizing a large construction materials data program. Giles (U.K.) that his Ministry would like to go beyond this with a World Bank of Technology Information.

What was clearly evident at the OECD IPG meeting was the increasing efforts of the

individual OECD countries to move faster in developing STI programs, the existence of healthy competition among them, and a willingness to share information about national developments. Dr. Hornig expressed his appreciation of the report and what the U.S.A was accomplishing in OECD's information efforts with an inscription on the report: "Good work, Andy." Plaudits aside, it was quite evident that the IPG had great value as an information producer and a way of spreading U.S. influence in the science communications area.

OECD's

In line with the statement of the Japanese delegate to IPG about the development of a Chinese character line printer, OST was visited by Dr. Sheeks, East-West Computer Co., Palo Alto, California, who explained that his organization was involved in the development of devices aimed at the more efficient use of Chinese language materials. One of his colleagues, he stated, had invented modern teleprinting devices for Chinese and Japanese, including a way to computerize and retrieve information. Sheeks' personal interest at that time was in creating and operating a Chinese language translation center.. In discussions with Sheets and others, it was felt that when these developments were translated into reliable devices and software packages there would be a considerable impact on the sharing of knowledge between two cultures. I was also aware that IBM was also working on a computer software program to make the use of Chinese idiograms possible. Obviously, there has been great progress over the years. The Chinese government which has been conducting advanced nuclear energy and other scientific programs for many years found it necessary to solve its language program. The Japanese dash into the world of computers has been rapid and the solution of the computer usage problem has been a high priority since the late 1960s. That it has been successful is seen in its emergence as a technology leader.

The workshop on national information systems for science and technology brought together groups from the Federal government, the two National Academies, professional societies, the industrial sector, and from academia. There was a considerable amount of excitement evident at the two-day meeting in mid-June 1968, since the

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prospects of a national information system would bring in a new era for all of the science communications community. While the possibility of problems kept some components of the current information structure somewhat uncertain, the professional societies, the universities, and even the private sector foresaw new opportunities and new resources to strengthen their future programs. Most of the attendees were curious about what the government had in mind, and recognized the need to be at the Front Royal, Virginia meeting to "protect their interests." Some word had gotten around to other groups about the national systems effort. Just before the meeting, OST was visited by the Romanian Deputy Minister (of Technology) and his entourage. The Minister was, according to him, interested in new relationships in science and technology with the United States, but ~~it~~^{his country} was ready to pay its way.¹

In his opening remarks at the Fort Royal meeting, Aines said among other comments:²

"There are a number of issues and problems that need to be considered:

How to relate national information development programs to the concept of the Networks for Knowledge.

How to develop simultaneously systems in government and non-government groups on a national and international scale, (featuring) efficient intercommunications operating with a new family of standards.

How to use information technology to lower the costs of information exchange and add to efficiency of the process.

How to reduce the amount of low-quality information and data that contributes to the so-called "information explosion."

How to achieve common services and cross-servicing to expedite the flow of information.

How to prepare a new generation of scientists, engineers and managers to use information technology more effectively, while developing new facilities.

How to finance the developing information systems and spell out how the Federal government could help with funds and other resources.

How the Federal government should structure its own growing information programs to maximize its contributions to a national information system.

How to determine how much centralization and decentralization are needed in the overall system and how to make changes as needed with passage of time.

¹ Aines, Andrew A. OST, Internal Memorandum, June 28, 1968, pp 1.

² Aines, Andrew A., OST, Problems for the Task Group on National Systems for Scientific and Technical Information and Guests to Consider, June 25, 1968, PP 1.

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In a quick summary of what happened at the Front Royal meeting, Aines reported to Dr. Hornig:¹

Emerging from the meeting is a strengthening of my view that more progress in (building a national system) is needed and only the government can provide the leadership to make this happen. The major problem is the need for more resources, mainly dedicated people. We do not have in COSATI enough people who are both creative and willing to work on this special problem. Top level people are also needed in OST, as previously discussed. The premature development of a large and expensive computerized information system should not be encouraged without strong evidence of need and the full participation of user communities (aside from the information managers who must also contribute.) The private sector representatives asked that they be kept in the loop to interact with the National Systems task force. More workshops of the kind held in Front Royal would be needed, they felt. Knox, now in the private sector, called for greater dependence on this sector and announced the formation of a new information trade association, the Industry Information Association (IIA), that would make cooperative ventures easier to achieve.

Reflecting on Knox' announcement many years later, makes me realize that it was his involvement as the first chairman of the National Systems Task Group and his recognition that the government was becoming a "powerhouse" in the STI community that had much to do with the formation of IIA to "protect the interests" of the for-profit information sector. Of course, there were other good reasons why IIA came into being, but some credit should be given to the efforts of COSATI during the middle-1960s.

In the same memorandum to Hornig were a few more items that reflected the changing times. FCC announced on June 27, 1968 the Carterfone decision, striking down the rule that prohibited the use of Carterfone and other telephone attachments on public toll telephone facilities, a decision that would have great importance in network development. Aines wrote, "The Decision takes its place besides the Supreme Court decision on the Fortnightly Case as a blow for more freedom in communications." On another development, Aines wrote: "Another straw in the wind is the recent agreement of the U.S. Securities and Exchange Commission to allow Leasco Systems & Research

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Front Royal Activities/ Weekly Activities Report, June 29, 1968, pp 3.

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the COSATI leaders, the study raised little general attention. One reason for this was the orientation of the COSATI and the information communities. The data study, along with the contractor study on informal communications, undertaken by the American Institute of Research, were add-ons to the study on documentation. Document-handling was the core operation of the Federal STI managers, hence received the most attention from them. Moreover, except for the efforts of the OST information staff to encourage more involvement of the data-handling community in STI matters, little along this line was being done within the public and the private sectors. It was an exasperating demonstration of the parochialism of the literature-oriented and the data-oriented sectors, both groups unable or unwilling to recognize the obvious affinity they shared in science communications. There were other reasons for the lack of attention given to the COSATI data study. One had to do with the size of the SDC document-handling study effort, which became a major operation with almost a dozen capable staff persons involved in a team operation. This group interacted vigorously with the COSATI National Systems Task Force. While the Science Communication, Inc. staff was just as capable, there were only two of them and they were less PA-oriented than the SDC ers, it appeared. Nevertheless, the Dr. Myatt and Dr Farris presented COSATI with a splendid set of reports.

While most of the people involved in STI were involved in controlling the "explosion of the scientific and technical literature," it was evident to some of us that the explosion of research and development data would be in every way just as or even more serious a ~~dilemma~~ in the future. It was evident that there was now a problem of use of large quantities of data already accumulated and proliferating because of the increase in the number of scientists and engineers, the use of powerful computers and telecommunications, the character of R&D that made the telemetering of data from space, earth and oceans much more available, and the influx of Federal funds into science and technology. We recognized the need of planning and action in this field, which was the reason why COSATI formed an ad hoc Task Force

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on Data Proliferation, under Dr. James Vette, Goddard Space Flight Center manager of the space data program. We recognized that the husbandry and exploitation of scientific and technical data was a/dramatic, new/requirement in achiev/ing true progress in science and technology. This is why we were pleased to find out where the great, new streams of data were coming from, one of the basic requirements for the contractor's investigation.

The first product of Science Communication, Inc. was delivered as a semi-annual progress report in early 1967.¹ The first part of this document included an introduction, project-structuring and planning and work accomplishments. The work accomplishments section was further subdivided into: staff orientation, exploratory field work, literature review and data survey accomplishments. Six exhibits were provided and an enclosure (Nr.1) was provided on the Current Status of Data Activities in Pharmacology. This was 55 pages long, also with references and other material. The objectives of the initial phase of a broad study were to:

Clarify the role that scientific and technical data -- in various stages of refinement -- play in the technical decision process.

Assess the degree of attention that is being given to data on the national level.

Formulate policies and/or actions that will benefit the interchange of technological know-how and the conduct of research and development.

The broad study was described as:

intended to establish how the various forms of data are acquired, stored, retrieved, packaged, and disseminated for specific types of users, why these packaging methods have been adopted, and what change in storage, retrieval, packaging, or dissemination of data are foreseen in the near future. Special emphasis is to be placed on uses made of the data by various functional groups (i.g., research, design, quality testing, product application, etc.) and the degree of processing or refinement of data needed for such functional groups. The Project will develop a census of data efforts in industry, the professions, and government to guide the formation of a national policy with respect to data collection, reduction, storage, retrieval, analysis, and dissemination...A further objective is to provide a forum for discussion among the many specialist groups and

¹ Farris, B.K. and Myatt, D.O., Science Communication, Inc. Washington, D.C., Study of Scientific and Technical Data Activities of National Importance, Semi-Annual Progress Report, February 6, 1967, conducted for the Task Group on National Systems, COSATI, Federal Council for Science & Technology, Contract F44620-67-C-0022. Approximately 200 pages, including exhibits and an enclosure.

Corporation to duplicate all of SEC's public documents via microfiche. Leasco now operates the NASA information-handling facility at College Park, Md., the function that the Department of Commerce wanted to operate. I fully expect that private outfits like Leasco and McGraw-Hill will deluge the Federal agencies with requests for agreements to disseminate their informational materials." Another historically interesting observation is made in the same memorandum, dealing with a meeting of the OST-Congressional "Marching and Chowder Club," chaired by Aines, at the National Library of Medicine. The purpose of this information troupe was to give interested staff members of Congress an opportunity to learn what was happening in the rapidly-growing information programs in the Executive Branch. I was adamant in the view that it was mandatory for the two major branches of government to work more closely in governmental information systems development. After a splendid "show and tell" by Dr. Cummings and his staff, a closed meeting was held, during which it became evident that congressional people were deeply unhappy with the state of congressional information systems. This was particularly true among the younger senators and representatives. The report to Hornig went on: "There has been a setback in plans to provide the Legislative Reference Service, now the Legislative Research Service, with computers., (but) the Clerk of the House has organized a new Dial Service to provide updated information about ongoing activities." Of course, the Congress has made great strides to upgrade its information services in recent years. Lately, the Senate, following the lead of the House of Representatives, has agreed to allow television to be used to record its proceedings, thus leveling the one remaining barrier to open its proceedings to the public.

One of the products of the Task Group on National Systems for Science and Technology that brought considerable pride was a series of reports on scientific and technical data, a study conducted by Science Communication, Inc., Washington, D.C. The Project Administrator and the Project Manager were DeWitt O. Myatt and Bill K. Farris, two conscientious and hard-working professionals. But as much pride as they generated to

individuals with interest in scientific and technical data. The Project will, thereby, serve as a means of making qualified groups and individuals more aware of the current capabilities and limitations of developing and applying scientific and technical data. Further, the Project will serve as a catalyst to encourage capable organizations and individuals to contribute to the development of improved systems.

On the next two pages is Table II-1 of the report, showing the elements of scientific and technical data activity. The breakout is adapted from the COSATI Subject Category List, described elsewhere in this book. Table II-2, the areas of scientific and technical effort, on pages II-4 through II-6 are not shown, except for the first item:

1. Aerospace Sciences and Space Engineering. Aerodynamics; aeronautical engineering; aircraft; astronautics; flight dynamics; flight instrumentation and control; ground equipment and facilities; launch vehicles; spacecraft; space environment.

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Table II-1

Elements of Scientific and
Technical Data ActivityData Generation and Use

<u>Scientific and Technical Effort</u>	<u>Phase of Scientific and Technical Effort</u>	<u>Types of Data</u>
Astronomy Behavioral and Social Sciences Biological Sciences Environmental Sciences Mathematical Sciences Physics Space Sciences	Basic	Raw Reduced Evaluated Reference Equation of State
Aeronautics and Aerospace Architectural Engineering Chemical Engineering Civil Engineering Construction Technology Electrical Engineering Electronics Energy Conversion Materials Engineering Mechanical Engineering Nuclear Technologies Oceanography Ordnance Pharmacology	Development	Design Form and Fit Maintainability Performance Reliability Test
Agriculture Conservation Food Technologies Medicine Machine Technology Military Sciences Transportation	Applications	Maintenance Manufacturing Operating Personnel Product Provisioning Quality Assurance Training

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Table II-1 (Continued)

Data PackagingMedia

Film
Hardcopy
Microform

Form

Coded
Descriptive
Graphic
Numerical
Coded

Artifacts

Bulletins
Catalogs
Charts
Compilations
Data Sheets
Drawings
Handbooks
Journals & Reports
Lists
Manuals, etc.

Data HandlingOperations

Collect
Reduce
Extract
Index
Evaluate
Store
Retrieve
Disseminate

Data Efforts

Program Planning
and Coordination
Data Collection Networks
Data Publishing Programs
Data Centers
Data-Document Depositories

Perhaps one of the least known special studies investigated by Science Communication, Inc. was the review of pharmacological data activities.¹ In describing the scope of this study, the authors state:

Pharmacology is that branch of the biological sciences which elucidates the reactions of foreign substances on animal cells, tissues, organs, and body systems. Pharmacological efforts are directed toward determining the activity of substances in humans. Veterinary pharmacology is directed toward similar studies in domestic animals. Toxicology and psychopharmacology are sub-disciplines which devote themselves to restricted segments of the total discipline. (Figure 1, below)

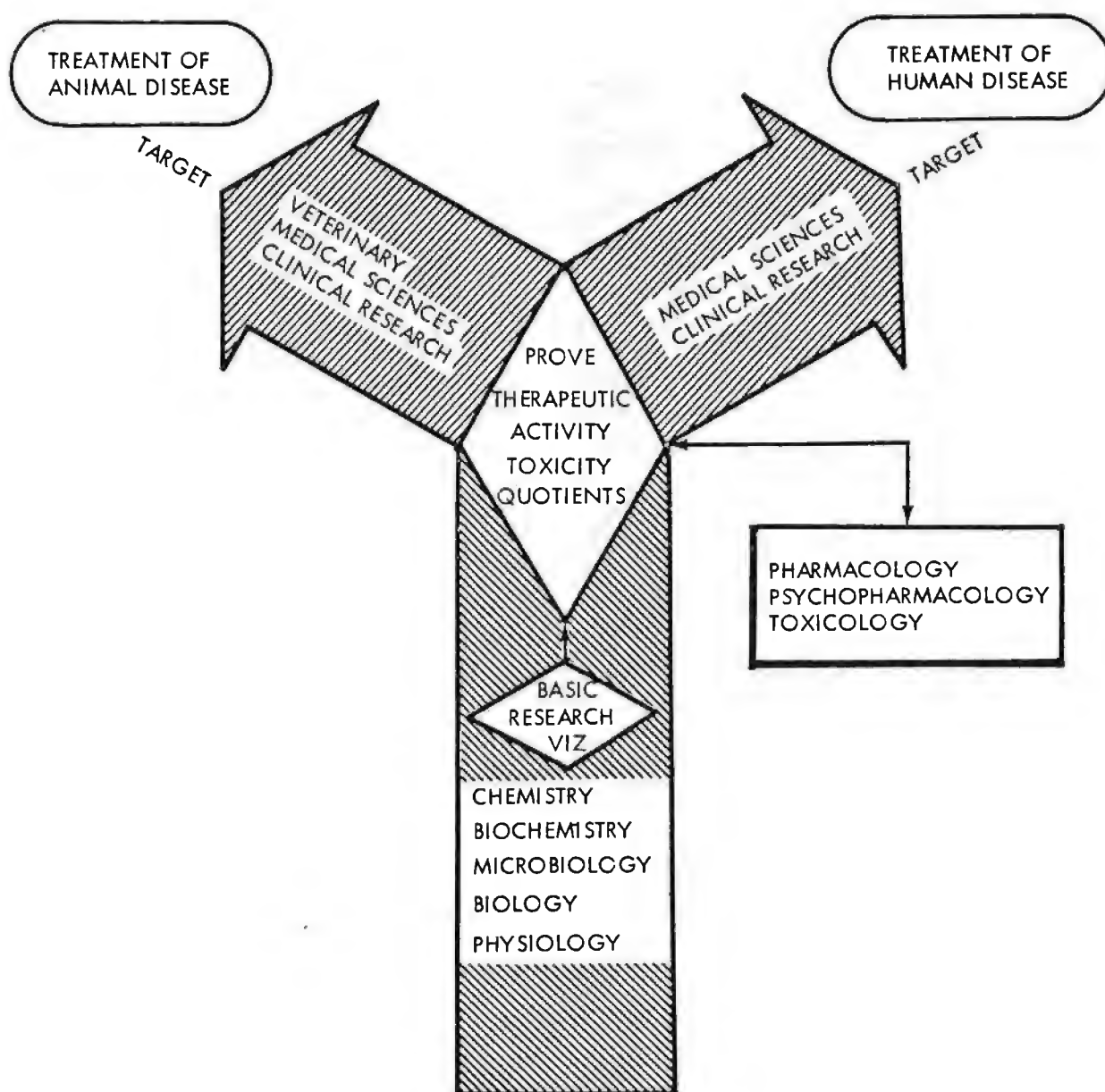


FIGURE 1. CRITICAL POSITION OF PHARMACOLOGY WITHIN THE BIOMEDICAL SCIENCES.

¹ Farris, B.K. and Wyatt, D.O., Science Communication, Inc., Current Status of Scientific and Technical Activities in Pharmacology, prepared for the COSATI Task Group on National Systems, February 1967, pp 55+.

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The second figures deals with data subject and commodity classifications devised by the investigators about 20 years ago. It is from page 5 of their report.

PHARMACOLOGICAL DATA SUBJECT AND COMMODITY CLASSIFICATIONS

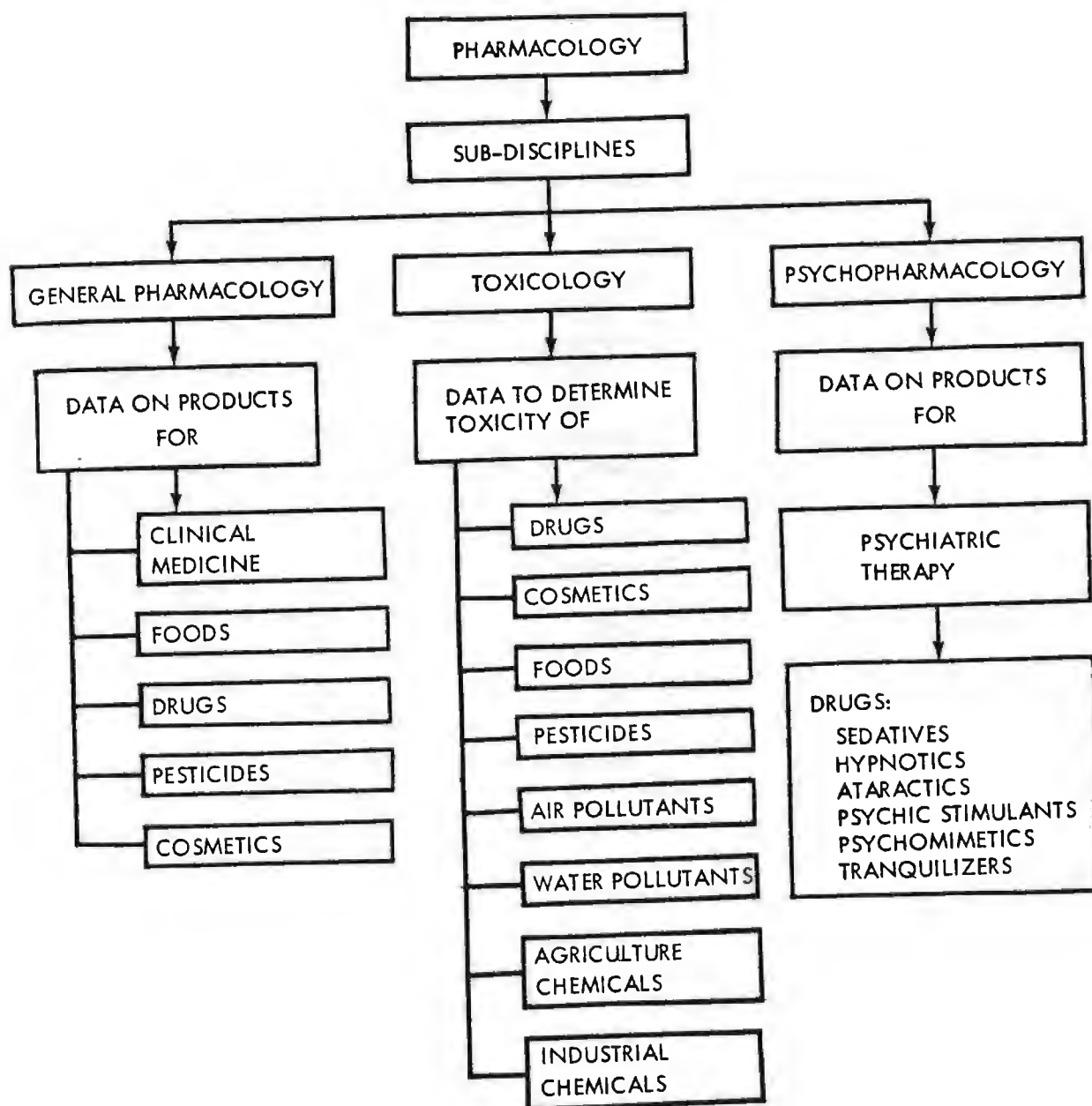


FIGURE 2. SHOWS DATA CLASSIFICATION WITHIN PHARMACOLOGY. THE CLASSIFICATION IS BASED UPON SUB-FIELD OF PHARMACOLOGY. COMMODITIES ARE ALIGNED WITHIN THE SPECIFIC SUB-DISCIPLINES.

The pharmacology section of the Science Communications Inc. interim report has a number of excellent tables and figures, but for purposes of illustration only one more is provided. This one depicts the Federal government organizations that have substantial missions in toxicological production, handling and use. It is shown on the next page.

Figure 3 shows the sources of pharmacological data generated throughout the world in many languages. They are produced in laboratories in universities, hospitals and various levels of government, but the largest amounts are to be found in the files of chemical, pharmaceutical and cosmetic manufacturers.

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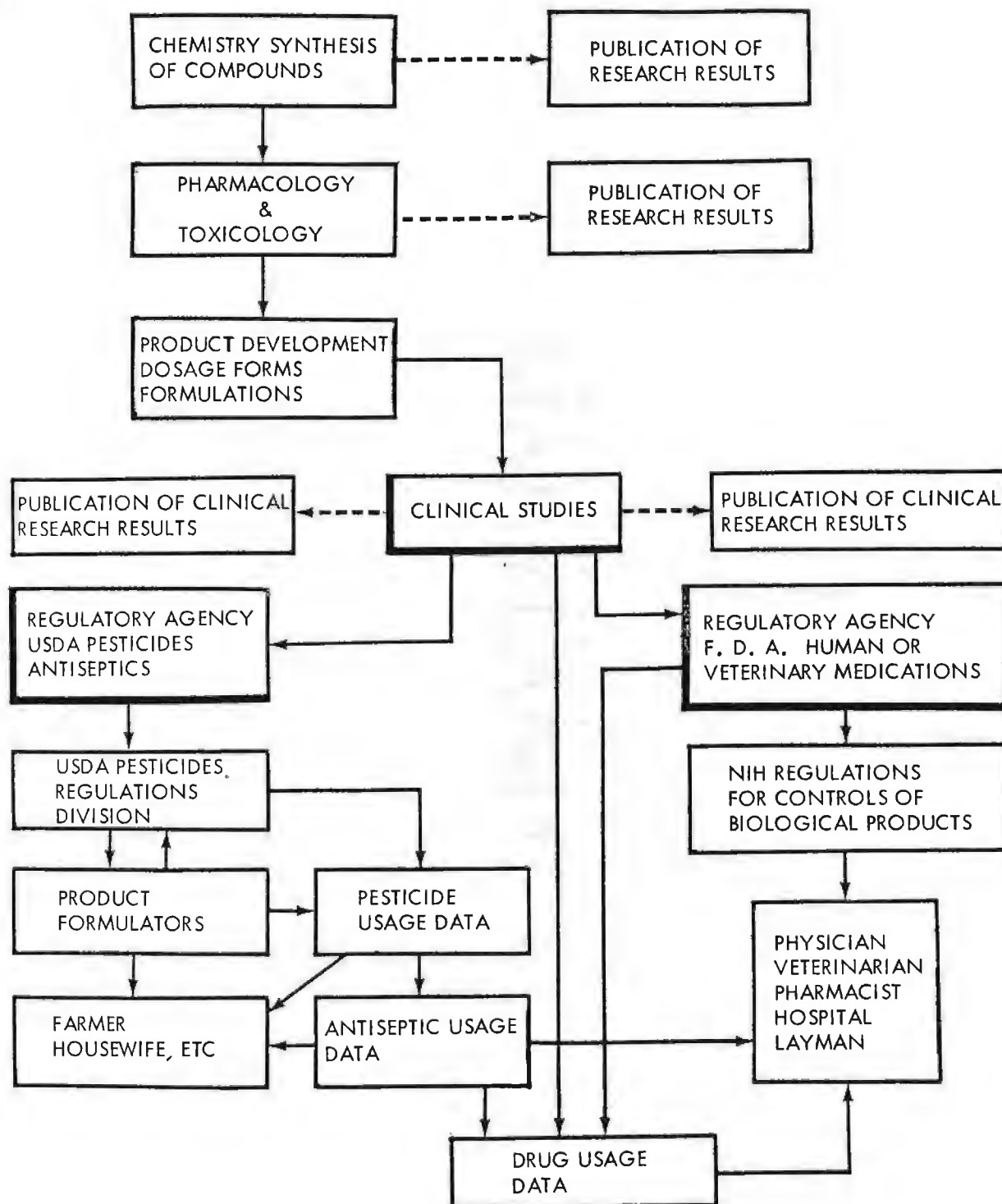


FIGURE 3. STEPS TOWARD THE DEVELOPMENT OF A BIOLOGICALLY ACTIVE SUBSTANCE. THESE STEPS DETERMINE THE DEVELOPMENT AND FLOW OF DATA PERTINENT TO PHARMACOLOGY.

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Recognizing that the SCI investigators were doing a very professional job in the preparation of its final report, there was considerable anticipation on the part of the National Systems Task Group. At the end of April 1968, it was delivered in two volumes. Volume I was a plan for study and implementation of national data systems. Volume II, which was bound separately from Volume I, was a preliminary census of scientific and technical data activities.¹ The funds for the study were provided by the Defense Advanced Research Projects Agency as a contribution to the work of COSATI. The contract was administered by the Air Force Office of Scientific Research. (Contract Nr.AF F44620-67-C-0022). The Foreword was a collection of background observations made by Presidents, scholars and scientists on the nature of the Information Age. Only one of these will be quoted, one made by Marshall McLuhan at a Symposium on Technology and World Trade, National Bureau of Standards, November 16, 1966. This quote, which I believe is a metaphor for this age, asserts: "The electronic age is once more the age of the hunter, only now it is the hunt for information, for data." How right he was.

The investigators prepared thirty pages of conclusions and recommendations divided into four categories: scientific and technical data-- perspectives and policy implications; current issues and problems -- nature and possible resolutions; systems development--requirements and implementation concepts; and systems capabilities-- assessments and remedial actions. Several of these are presented to give the reader little more than an inkling of the total menu.

1. Conclusion: The utility of our national scientific and technical data resource can be substantially increased by improved management.

Recommendation: The Executive Office of the President should issue a policy statement establishing the objectives of a national program to improve the management of scientific and technical activities within gov-

¹ Farris, B.K. and Wyatt, D.O, Science Communication, Inc., Washington, D.C. Study of Scientific and Technical Activities in the United States, Volume I, Plan for Study and Implementation of National Data System Concepts, April 30, 1968, about 150 pages plus exhibits.

ernment, the professions and industry.

2. Conclusion: No effective means currently exists for coordinating and integrating the data managing and data handling activities of governmental, professional, and industrial sectors of science and technology.

Recommendation: A National Advisory Council for Scientific and Technical data should be established.

3. Conclusion: Scientific and technical data and data activities are exceedingly complex; national data programs and system development efforts must be capable of effectively recognizing and accommodating this complexity.

Recommendation: National data programs and related policies must be implemented with due consideration of the diverse types of data activities which are conducted as an integral and vital part of science and technology.

4. Conclusion: The full utility of scientific and technical data is not currently realized under existing data management and data-handling policies.

Recommendation: Each scientific or technical community, including mission-oriented agencies, should reappraise its current procedures for managing and handling scientific and technical data, especially in regard to their adequacy for conservation of the data as a costly and potentially and reusable resource.

5. Conclusion: There is inadequate knowledge concerning the nature (quantity, quality, location, ownership, usefulness, etc.) for existing scientific and technical data to permit optimum design of national data management programs or data handling systems.

Recommendation: A national Index of Scientific and Technical Data should be developed. Such an index is essential if data management is to be planned on a systematic basis. Also, such an index would be immediately useful to scientists and technologists who currently expend as much as 30% of their working hours searching for data required to do their job.

6. Conclusion: Federal policy relative to scientific and technical data management must recognize and facilitate maximum use of the existing scientific and technical data resource.

Recommendation: The Federal Government should establish a policy to encourage the accessibility of scientific and technical data to as many users as possible.

The rest of Volume I is a veritable encyclopedia of information, appraisals, issues, and statistics bearing on scientific and technical data, perhaps the most intensive examination ever made. Some of the charts and other figures are unique representations and constructions ever prepared in the STI field. Readers will be enriched by a more comprehensive review of the publication.

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Volume II of the study is another valuable lore of knowledge pertaining to scientific and technical data.¹ Consisting of 860 pages, it is far too long to cover in this book. Part A is a current status of data activities in science and technology. Covered are: structure and content, current status of activities in ten selected fields of science and technology, and the current status of basic, developmental and applications data activities. Part B focuses on surveys and probes of selected elements of scientific and technical data activity, further sub-divided into structure and content; survey of centrally coordinated data activities of medical schools and related research institutions; survey of data activities of selected professional societies and trade associations; survey of commercial data centers which process scientific and technical data; summary of scientific and technical data files of the Department of the Army; and review of equipment capabilities for scientific and technical data handling. Part C contains a preliminary census of scientific and technical data efforts. Section I is a rationale, structure, and content of the census of data efforts. Section II - Preliminary Census of Formal Data Efforts - is further divided into: data collection networks and programs; specialized data publishing programs; data service centers; data-document depositories; data programs development and coordination; non-designated (Agency) data handling and service operations; and finally, small developing data handling and service operations.

Examples of the alphabetical listing of data efforts - two of five pages - are included in the next two pages. These show the wide range of data efforts found by Science Communication, Inc. investigators. The symbols on the right of each item show where a much fuller description of the data effort is to be found. How many of these programs exist is difficult to estimate, but undoubtedly some have disappeared and many new data efforts have been started.

¹ Farris, B.K. and Wyatt, D.O., Science Communication, Inc., Washington, D.C., Study of Scientific and Technical Activities in the United States, Vol. II, Preliminary Census of Scientific and Technical Data Activities, April 30, 1968. Vol. II consists of Parts A, B and C., approx 860 pages.

Science Communication

Washington, D. C. 200 07

COSATI Data Activities Study

Final Report - F44620-67-C-0022

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ALPHABETICAL LISTING OF DATA EFFORTS

- Accelerator Information Center..... C1
 ADRES. See: Army Data Retrieval Engineering System.
 Advances in Chemistry Series.....B1
 Advisory Center on Toxicology.....C2
 AEC Engineering Materials Document Depository..... D1
 Aeronautical Chart and Information Center.....D39
 Aeronautical Standards Group Publication Program.....B2
 A.I.Ch.E. System on Estimating Physical Properties.
 See: American Institute of Chemical Engineers
 System on Estimating Physical Properties.
 Air Force Global Weather Central.....C3
 Air Force Machinability Data Center.....C4
 Air Force Materials Information Centers Program.....E1
 Air Force Motion Picture Depository.....D2
 Air Force Still Photographic Depository.....D3
 Air Quality and Emission Data Program.....E2
 Alcoa Technical Handbooks.....B3
 Alloy Data Center.....C5
 The American Association of Petroleum Geologists
 Committee on Statistics of Drilling.
 See: Statistics of Drilling & Related Data for
 Oil & Gas Industry.
 American Chemical Society Publication Program.
 See: Advances in Chemistry Series.
 American Institute of Chemical Engineers (A.I.Ch.E.)
 System on Estimating Physical Properties.....E3
 American Institute of Steel Construction
 Technical Publications.....B4
 American Ordnance Association (AOA)
 Engineering Data Management Section.....E4
 American Petroleum Institute (API) Research
 Project 44. See also: Thermodynamics
 Research Center.....C6
 American Society for Metals Handbooks Program.
 See: Metals Handbook.
 American Society of Heating, Refrigerating and
 Air Conditioning Engineers Data Publication
 Program. See: ASHRAE Guide and Data Book.
 American Society of Mechanical Engineers (ASME)
 Technical Data Program.....B5
 American Society for Testing and Materials (ASTM)
 Numerical Data Project.....E5
 American Society for Testing and Materials (ASTM)
 Publication Program.....B6
 Animal Morbidity and Mortality Data System.....E6
 AOA Engineering Data Management Section.
 See: American Ordnance Association Engineering
 Data Management Section.
 API Research Project 44. See: American Petroleum
 Institute Research Project 44.
 Argonne Code Center.....D4
 Army Data Retrieval Engineering System (ADRES).....D5
 Army Map Service.....D6
 Army Mobility Equipment Document Depository.....D7
 Ascarn Vendor Data File. See: Sweet's Industrial
 Information Systems.
 ASHRAE Guide and Data Book.....B7
 ASME Technical Data Program. See: American
 Society of Mechanical Engineers Technical
 Data Program.
 ASTM Joint Committee on Atomic and Molecular
 Standards. See: Powder Diffraction Standards
 Data Program.
 ASTM Numerical Data Project. See: American
 Society for Testing and Materials Numerical
 Data Project.
 ASTM Publication Program. See: American
 Society for Testing and Materials Publication
 Program.
 Atlantic Undersea Test and Evaluation
 Center (AUTC).....F1
 Atomic Collision Cross Sections Data Center.....C7
 Atomic and Molecular Physical Data Program.....C8
 Atomic and Molecular Processes Information Center..C9
 Atomic Transition Probabilities Data Center.....C10
 AUTC. See: Atlantic Undersea Test and
 Evaluation Center.
 Automated Hospital Information System (AHIS).....C11

 Biological Handbooks. See: Office of
 Biological Handbooks.
 Bureau of Applied Social Science.....C12
 Bureau of the Census.....C13
 Bureau of Labor Statistics Information System.....C14

 Cancer Chemotherapy Program Analysis Branch.....F2
 Center for Diffusion in Gases.....C15
 Central Bureau for Astronomical Telegrams.....A1
 Charged-Particle Cross-Section Data Center.....C16
 Chemical Information and Data System (CIDS).....E7
 Chemical Thermodynamics Data Group.....C17
 Chemical Thermodynamics Research Center.
 See: Thermodynamics Research Center and
 American Petroleum Institute (API)
 Research Project 44.
 CIDS. See: Chemical Information and Data System.
 CINDA. See: Computer Index Neutron Data.
 "Circular 500". See: Chemical Thermodynamics
 Data Group.
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Science Communication

Washington, D. C. 200 07

COSATI Data Activities Study
Final Report - F44620-67-C-0022

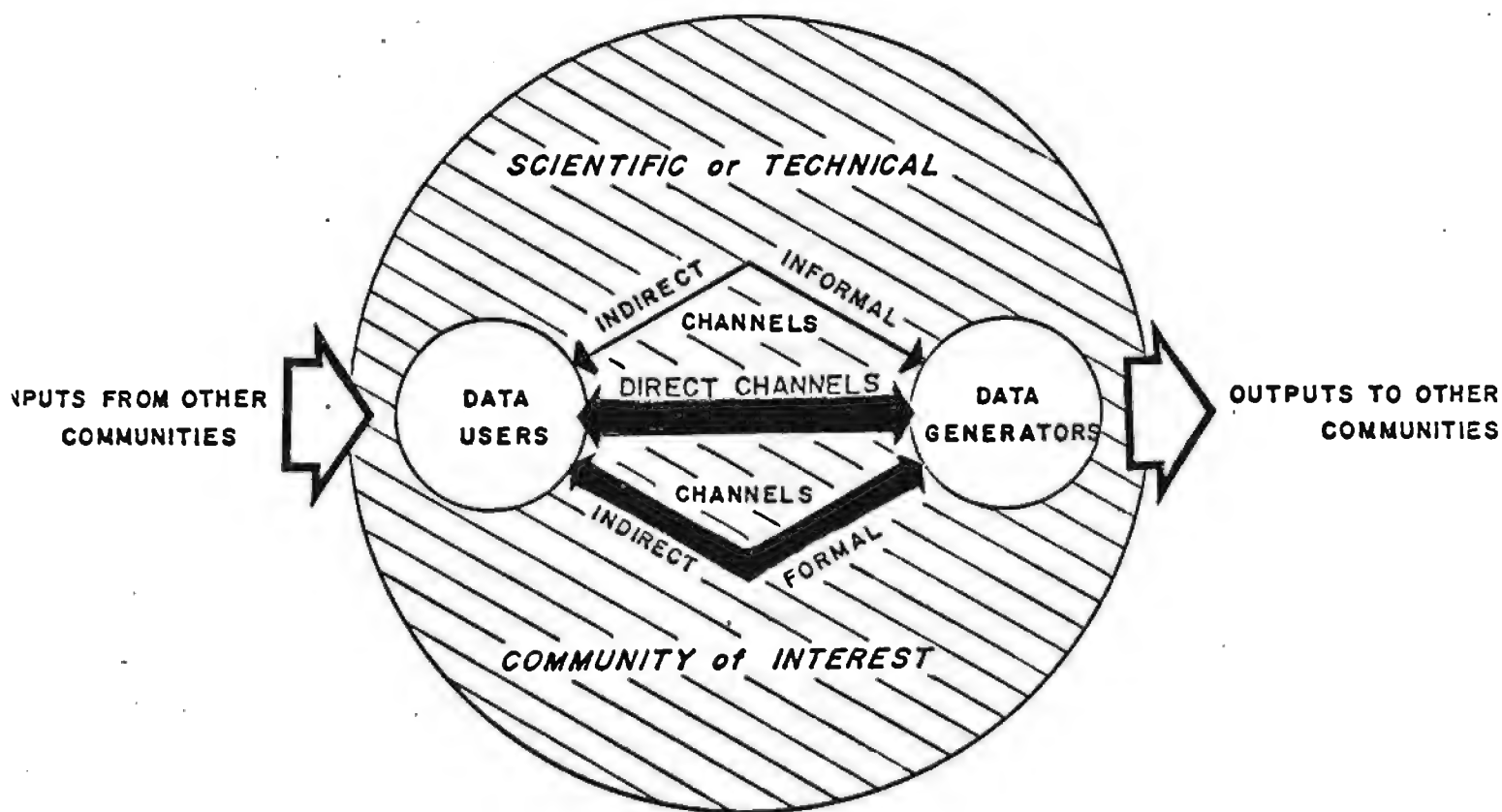
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The conscientious work done by the Science Communication, Inc. investigators is reflected in the two schematics on this and the next page. They show the increasing complexity of flow, both direct and indirect. As the world of science and technology

SCHEMATIC OF DATA FLOW WITHIN DEFINED
SCIENTIFIC AND TECHNOLOGICAL COMMUNITIES

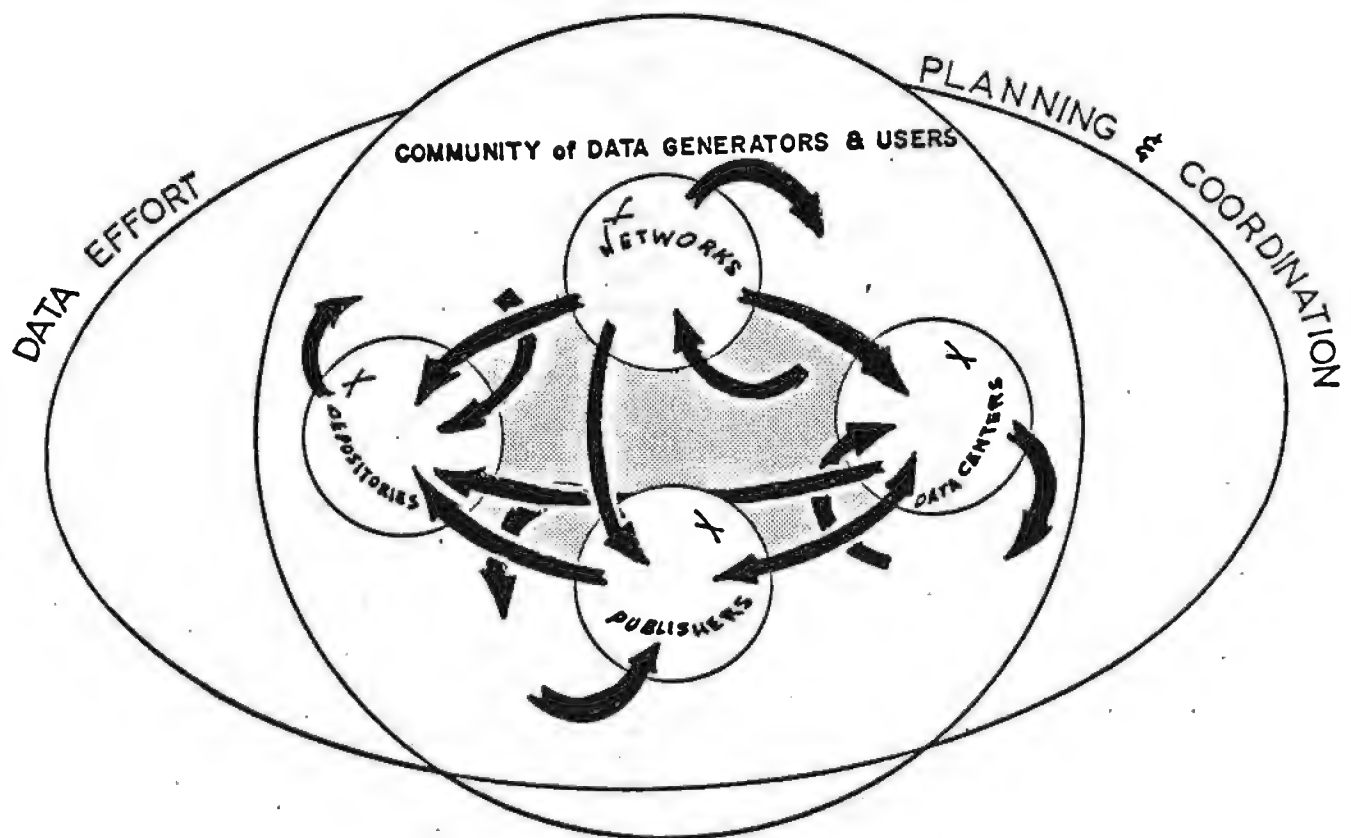


expands over time, so does the scientific and technical information and data produced by the enlarging science and technology estates also increase. The need for better understanding and management of data flows is a point made by the investigators in the SDI study.

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The schematic below goes one step more showing the need for improved planning and coordination. Because the process is global in nature, the logic for these actions is evident. However, this reality has not necessarily resulted in strong pro-

**SCHEMATIC OF FUNCTIONAL DATA EFFORTS SERVING A
DEFINED COMMUNITY OF SCIENTIFIC AND TECHNICAL ACTIVITY**



grams. The international Codata program falls far short of accomplishing this goal. It would probably be true to state that the data study performed by SDI for COSATI is known by very few individuals in the world, including the Codata members. This is unfortunate.

To conclude the discussion of the Farris-Myatt studies, one final schematic is provided, one that depicts the principal organizational and programmatic elements of the national scientific and technical data program as envisioned by the authors of the report. The organizations shown have undergone change or termination. OST, FCST and COSATI have disappeared; OST has been replaced by the Office of Science and Technology Policy; and FCST has been replaced by the Federal Coordinating Committee on Science, Engineering and Technology. COSATI has been completely terminated. The Bureau of the Budget is now the Office of Management and Budget. The National Advisory Council for Scientific and Technical Data never came into being.

On reflection, the scientific and technical data report was one of the outstanding products of COSATI. One of Aines' comments to Dr. Hornig regarding it was: ¹

In my view, this report in some measure is more useful than the System Development, Incorporated's study on document-handling.

Failure to pick up on some of its recommendations with implementing actions was a mistake, but not one that can be blamed on OST and COSATI. Failure to provide the additional resources needed was the coup de grace that spelled the death-knell for the national systems program. Fortunately, if the opportunity comes again, the SCI report can be dusted off, updated, and brought into being. A listing of fields of special interest to OST during that time frame, involving both data and literature, was prepared and submitted to the Science Advisor. ² The name of the program and the responsible agency are shown.

(see page 126 for the list of programs and agency stewards)

The purpose of the list, as expressed in the memorandum, was not to show historical accomplishments in the STI field, but to demonstrate where OST had taken actions to show leadership. Some of the claims were that the programs included those to improve STI communications between scientists, engineers, scholars, managers and others, using

¹ Aines, Andrew A., OST, Memorandum to Donald F. Hornig, Director OST, Subject: SCI Report, July 30, 1968, 1 page. (This memorandum accompanied copies of the Science Communication report the OST Director.)

² Aines, Andrew A., OST, Memorandum to Dr. Hornig, OST Director, Subject: A Summary of

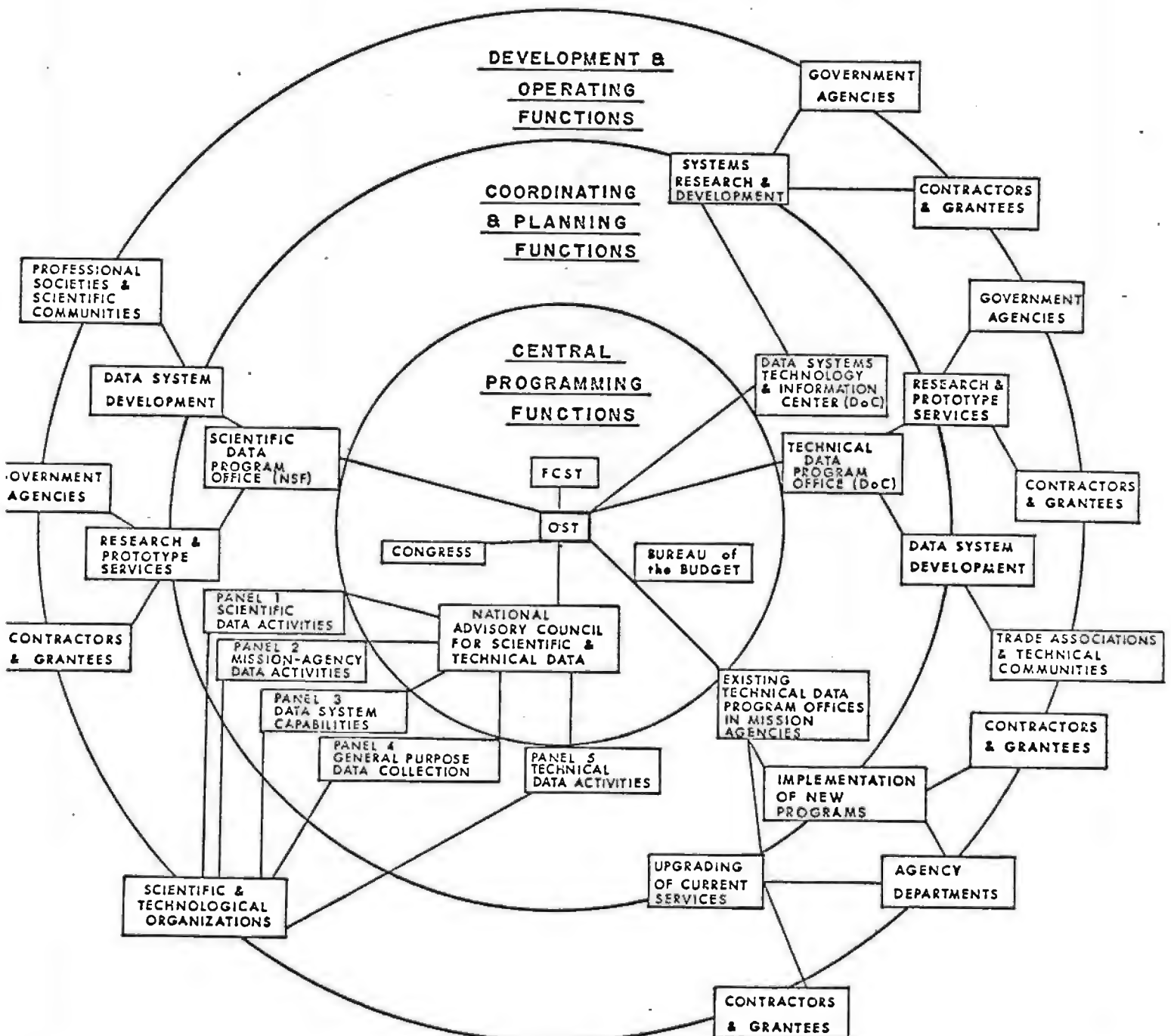
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PRINCIPAL ORGANIZATIONAL AND PROGRAMMATIC ELEMENTS OF THE NATIONAL SCIENTIFIC AND TECHNICAL DATA PROGRAM



That which follows is a list of subjects of special interest to the OST staff, subjects involving the broad spectrum of scientific and technical communications.

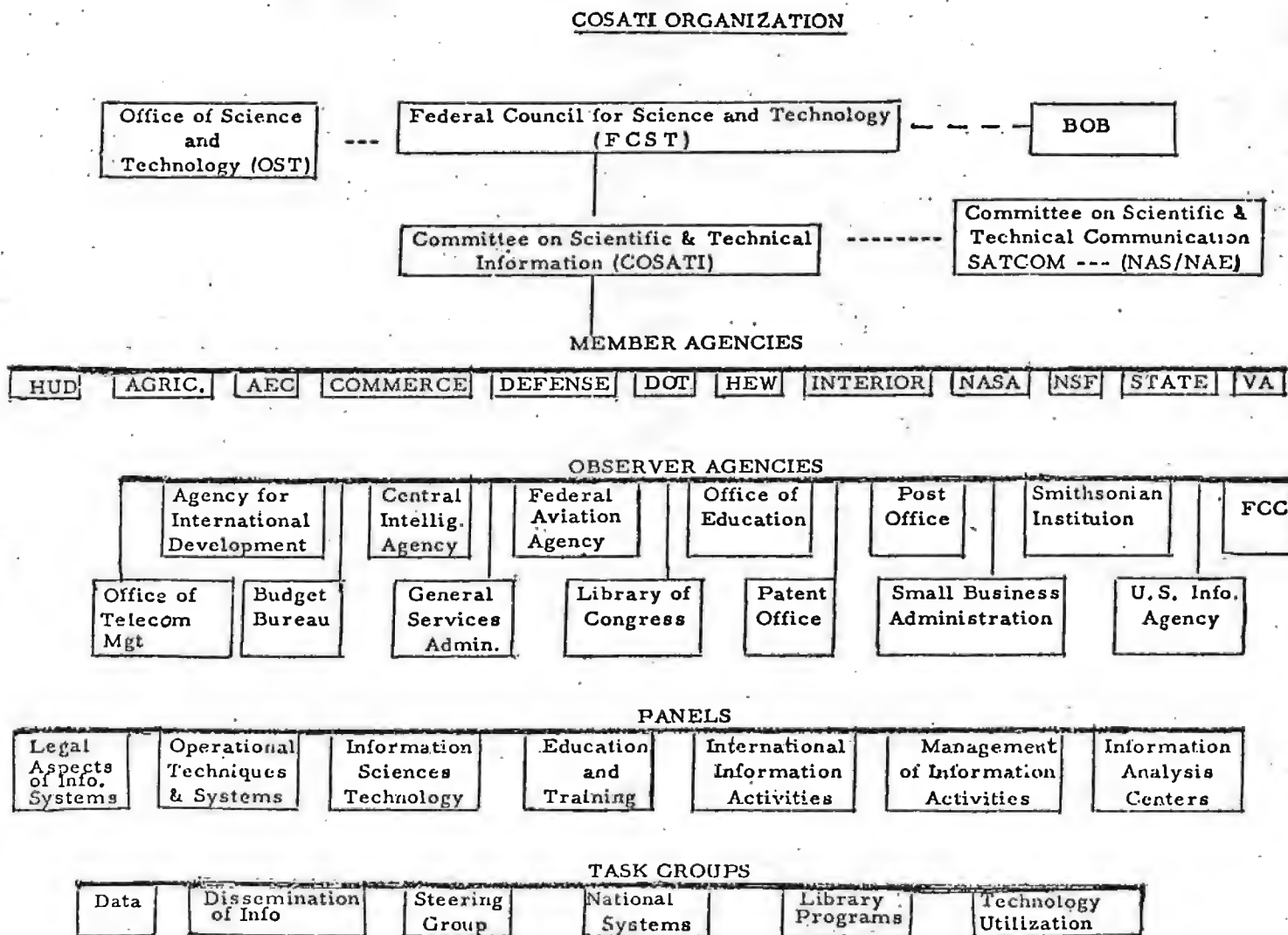
There is an ever-growing list of information and data systems over which we are trying to provide an umbrella of interest and practical guidance leading to orderly growth. Here are some of them:

- a. Water Resources Information System (Interior)
- b. Modernization of Patent Information (Patent Office)
- c. National Biomedical Information System (HEW)
- d. National Toxicological Information System (HEW)
- e. Educational Resources Information Centers (HEW)
- f. Automation of Primary Publications (NSF)
- g. National Standard Reference Data System (NBS)
- h. Specialized Information Centers (DOD)
- i. Specialized Information Centers (HEW)
- j. Specialized Information Centers (AEC)
- i. National Chemical Information System (NSF)
- k. Clearinghouse for Federal Scientific and Technical Information (NBS)
- l. National Referral Center for Scientific and Technical Information (LC)
- m. Science Information Exchange (Smithsonian)
- n. Information Sciences Technology Reporting System (COSATI)
- o. National Agricultural Information System (NAL)
- p. Food and Drug Information System (FDA)
- q. National Library of Medicine and MEDLARS (HEW)
- r. State Technical Services Program (Commerce)
- s. Patent Information Program (Patent Office)
- t. Interuniversity Communications Council Programs (EDUCOM)
- u. Chemical Information System (ACS)
- v. Engineering Information and Data System (EJC)
- w. Physics Information System (AIP)
- x. Defense Documentation and Other Information Systems. (DOD)
- y. National Data Program for the Marine Environment (Marine Council)
- z. Space Information Systems (NASA)
- aa. Nuclear Energy Information Systems (AEC)
- bb. Environmental Services Information Systems (ESSA)
- cc. National Serials Data System (NSF)

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new and conventional information technology and techniques; to improve S TI coordination within the Federal government; to stimulate education and training for scientists, engineers and information workers; to contribute towards national and international STI systems; to stimulate management improvements within the government; all in all, there were 21 statements to underscore the effort being made by OST in the Federal and national information arenas.

All of the efforts to achieve these objectives were accomplished with an OST staff of three (sometimes less) professionals and the resources of COSATI. As of June 10, 1968, the organization chart of COSATI was as follows:



June 10, 1968

As the Information Revolution left its mark on the efforts of OST and COSATI, it was growingly obvious that the COSATI chairman (Aines) and its Executive Secretary (Rossmassler, on loan from NBS) could hardly cover all of the challenges and opportunities that were evident during the last half of 1968. For a period of time, the staff was buoyed by the expectation that a few spaces would be granted OST and these would be filled by information staff augmentees. A three-year plan was prepared for the Executive Secretary of the Federal Council for Science and Technology, Dr. Charles V. Kidd, whose purpose it was to look at priority actions for the years 1969-1971.¹ The plan specifically laid out a course of action for these three years and also discussed longer term needs, 1972 and beyond. Priorities were laid out in several areas: improvements in current practices, collaboration among Federal agencies, increased national and international participation especially in the establishment of databases and networks, improved management of Federal STI programs, increased numbers of agency stewardship reviews by OST and BOB, closer interaction with non-governmental information groups (professional societies, academic groups, publishers, private information vendors, and libraries.

The introduction of the plan made strong reference to the Weinberg Report, which had received the complete approval of PSAC and OST leadership in earlier years. Four categories for special attention were designated for FY 1969-1970: direct user orientation, management of STI, technical improvements, and international development. Individual actions for COSATI were detailed under these four headings. The plan for Fiscal Years 1970-1972 called for an initiative to encourage author-prepared standard descriptive abstracts to accompany their publications, resulting from government-supported research and development. Another part of the plan focused on the problem of the continuing accumulation of large amounts of data, such as those generated by satellite and oceanographic programs, as reported in the Science Communications, Inc.

¹ Aines, Andrew A., OST, Memorandum for Dr. Charles V. Kidd, FCST, Subject: Three-Year Plan for Progress in Scientific and Technical Information, August 2, 1968, pp 10, unpublished.

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study on national data systems in 1968. Recommended for specific action were initiatives such as: a COSATI inventory of growing banks of scientific and technical data, an appraisal of the use and value of the data banks, a determination of the best methods of accumulating and storing data, and six others. Other areas for study and action in the 1970-1972 period were: library information systems, standards and guidelines, information analysis centers, government-wide R&D project reporting, a national index of scientific and technical data for scientists and engineers, technology transfer, and full integration of programming, planning, budgeting into the Federal STI scene. There were a number of other recommended actions to be undertaken, but some of these would be undertaken only if there was an implementation of staff. It was a disappointment to learn subsequently that Dr. Hornig's request for additional spaces for OST, including four persons for the STI programs, was turned down. Although stung with this denial of additional help, we resolved to work even harder to achieve some of the goals and initiatives mentioned in our plan.

An example of this resolve was evident in the activities mentioned in the weekly report to Dr. Hornig, dated August 4, 1968.¹ A few of the individual items are reported below:

Soviets and the Mona Lisa Smile. Scott Adams, Deputy Director of NLM (and a highly respected operator in the international field) acted as a go-between in a trip to Europe where he met with A.A. Arutunov (Soviet Union) to determine if the Soviet Union was ready to meet with a U.S. delegation, perhaps under FID or ICSU-UNESCO sponsorship. Arutunoff agreed in principle for such a meeting to discuss mutual information programs and problems, according to Adams.

Holiday for Spooks. According to the House Defense Appropriations subcommittee, after recent hearings, ... evidence has been produced (according to a Washington Star editorial (July 24, 1968) that show that our spies in the field are collecting more information than the home processing plant can keep up with. It now takes eight days for the DIA to get to a received document to analyze it. There were recently 517 linear feet of files of unprocessed information about SE Asia alone....The glut of information above capacity is not new. The stock market has been caught in the same bind for months now.

1 Aines, Andrew A., OST, Memorandum for Dr. Donald F. Hornig, Director, OST, Subject: The Week that Was or Should Have Been, August 4, 1968, pp 5.

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The article also divulged that:

There is just plain old bureacratic bumbling. During the six-day war in the Middle East last year, a message to the Liberty (a U.S. naval vessel), telling it to change its course, was sent to the Philippines by mistake, then sent back to the Pentagon and finally reached the Liberty after the ship had been fired on and had lost 24 crew members to Israeli action.

Not mentioned in the article was the failure of the U.S. government to inform the Israeli's that the Liberty was operating in waters of the Mid-East. The Washington Star article went on to point out that the stock market was solving its problem by closing its trading down on Wednesday so that it could catch up to its paperwork. It concluded with this comment:

If this works for bulls and bears, no doubt it will also work for cloaks and daggers. We propose that the spooks laboring in the field take Wednesdays off until those working the files get caught up.

Interestingly, the stock market solved its problem by creating a sophisticated information system with the passage of years. Presumably, the Department of Defense has improved its capabilities in intervening years - one would hope. Aines completed his comments to Hornig as follows:

"The information explosion, se-called, is just as much a problem in shifting resources to use the incoming materials as it is in the quantity of the stuff being generated. We know that the data flow is going to continue to increase in science and technology because we are using more sophisticated means of obtaining the data (like using telemetry for gathering space data). This is one reason for the new COSATI task group on synoptic data (being formed)."

The third item in the weekly report to Hornig used a presidential announcement to make a point:

A Few Words on the John E. Fogarty Center. I noted that David (Milo) Leavitt of NIH (a member of COSATI)...has been named to head the John E. Fogarty International Center for Advanced Study in the Health Sciences, ...In the presidential release about the establishment of the center are words like: "The exchange of knowledge among the world's foremost scientists... Collaborate in advancing knowledge...We need to share our knowledge and learn from others...We must exchange ideas about how to solve..." (Aines went on in his note to Hornig: That this new project will enhance science communications is self-evident, ... it is obvious in addition that this ought to be considered part of the national biomedical information program and so labelled. I note wryly that the Congress has set aside a half-million dollars for the center, yet in

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its infinite wisdom has not seen the virtue in providing (OST) with a couple of people to help make such programs more successful and efficient. Alas!

Other items discussed in the weekly memorandum to Hornig: the first meeting of the project-reporting advisory group and the contractor; information that the National Advisory Committee on Libraries had completed its report, but had discussed its contents prematurely at a meeting of the American Library Association meeting in June; a meeting held with officials of the Department of Transportation to protest that agency's action in turning its STI program to an administrative office rather than the DOT science advisor; the assignment of a DOD official to assist OST and COSATI in the development of a major engineering information meeting that was being sought by the engineering community which was experiencing internal difficulties in achieving a profession-wide information program; an expression of concern that about 40 Americans were going to a Moscow meeting held by the International Federation of Documentation (funds for a considerable number of Americans who expressed interest in the meeting was being provided by the National Science Foundation.); and what was referred to as the "Senator Mansfield Caper," a request to ODDR&E for copies of all of its R&D work projects, a very expensive information-gathering program whose purpose it presumably was to mine the truck-load of reports for hard-to-explain R&D project titles.

During the early 1960s, it was the practice of some congressional committees to include in public laws setting forth agency missions titles that required them to conduct organized scientific and technical information dissemination programs. One of the tasks given to the COSATI Task Group on the Dissemination of Information was to gather from each of the COSATI agencies the legislative authority, if any, that authorized them to conduct STI dissemination programs. Dr. Hornig supported the effort and signed out a letter to each member of the Federal Council for Science and Technology to provide the information to the Task Group chairman, Colonel Currie S. Downie, USAF. Similar letters were sent to the heads of COSATI observer agencies.

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The result of the survey was a list of COSATI members and observers whose agencies were legislatively directed to disseminate the information resulting from their R&D or equivalent programs. As would be expected, agencies supported with statutory authority had the strongest programs, even if the funds used for those programs were not sequestered solely for STI purposes. Conversely, those that operated without such authority appeared to be less diligent in conducting their STI programs, especially if the STI program was conducted by other than the senior science advisor or science manager in the agency. Even back in the 1960s, when information matters had not yet been considered by some of the agencies as priority programs, there was jockeying on the part of senior management, administration and comptroller groups for control of all information programs within an agency. This movement became much stronger in the subsequent years and reached a pinnacle when the Paperwork Reduction Act was passed at the close of the Carter Administration that gave the OMB management group involved in information and regulatory affairs considerably more power in the information/^{policy}area at the expense of the budget examiners' group within OMB.

The personnel problem for the OST office of STI became acute when Dr. Leonard Karel who had been on detail with COSATI from the National Library of Medicine returned to that organization with an expression of our gratitude.¹ The National Science Foundation, complaining about funding difficulties, sought a way, working with BOB, to solve the Smithsonian Information Exchange problem. NSF which was responsible for funding SIE during this period, because of increasing difficulties with the management of SIE and Smithsonian Institution, was looking for ways to divest itself of what had become an onerous requirement. OMB approached Peat, Marwick & Livingston officials who were undertaking the government-wide project reporting study for guidance on how to solve the dilemma. Unfortunately, the PML study team had just started and was not in the position to provide the sought recommendation.

¹ Aines, Andrew A., OST, Memorandum to Donald F. Hornig, Director, OST, Subject: Highlights of the Week, August 17, 1986, pp 3.

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Another problem that was brought to our attention involved NASA and the Commerce' Clearinghouse for Scientific and Technical Information. After CFSTI had taken over the dissemination of DOD technical reports to the public, it sought to extend this bridgehead into what NASA considered its own territory. The suitor, CFSTI, claimed that there would be savings to the Federal government, if NASA agreed to its request. NASA was operating its own public dissemination center as a contract operation at College Park, MD. and, as part of this operation, was issuing its announcement publication, STAR, from the center. Microfiche dissemination also part of the operation. This was an interesting confrontation, because both CFSTI and NASA had public laws that authorized their programs. CFSTI claimed the highground because it was involved in a governmentwide program that provided a single port of entry for those seeking government technical reports, while NASA was able to point out that it was using a private contractor instead of government personnel, thus was in tune with BOB directives that advocated the use of private contractors. Interaction between the two agencies had not accomplished what CFSTI sought, hence the guidance of OST was requested by the two parties. After this was done, however, the two agencies agreed to a truce that resulted in some gains for CFSTI, but retention of the NASA contractor operation.

The weekly report to Hornig (August 17, 1968) contained an interesting item, entitled The Age of Revolt: The reader will remember that the period was one of challenges to authority by students and minorities. It was in this connection that Aines wrote:

It may be that one of these days, we are going to get a request that we agree to the formation of a Clearinghouse on Revolt Phenomena. (Not only were universities under attack, but) the staid American Library Association is going through a difficult period. The treasurer of the ALA Council, in lieu of a report on finances, gave his diagnosis of ALA's operational and organizational ailments, reporting that "ALA is a bureaucracy of component bureaucracies, all of which are controlled and operated by a relatively small number of senior members...A positive program involving younger members should be undertaken." At the same meeting, Don Roberts of the Los Angeles Public Library contended that librarians serve no more than 10 percent of their communities. To reach the larger population who are not geared to reading, it is necessary that 50 percent of library publications (holdings) be electronic in nature. Shades of McLuhan!

Fortunately, the tide for institutional change receded and there was no need for a Clearinghouse on Revolt Phenomena, nor did the users of libraries demand a shift to /electronic informational materials as envisioned by Don Roberts. Books and other printed materials remain the staple of American libraries today, even though many libraries today provide video cassettes, movie film, and a small minority also provides gardening implements and other household devices to their patrons.

On the international front, a report was prepared by Harrison Brown, Foreign Secretary of the National Academy of Sciences. Its title was "Report of the Committee on the Quality and Organization of International Scientific Meetings." Aines reviewed the document for Dr. Hornig. The one point that made the most impact on me was the statement that a "disproportionately small number of international scientific meetings are held in the United States." This came as a shock since it was felt that the number of international meetings held in the United States was comparatively large. It would be an interesting topic for exploration in the late 1980s by science communications scholars and others. It was during this period that we were visited by Kil Byung Min, the director of the Korean Department of Technical Information Research, who was in the process of developing the Korea Institute of Science and Technology. Min was undergoing a six-months training course at Battelle Memorial, Columbus, Ohio, which was operating under an A.I.D. contract to train a number of people of the Korea Institute of Science and Technology. We felt that both A.I.D. and Battelle were providing a valuable service in support of U.S. foreign policy. Unfortunately, Mr. Min had a serious problem with English, hence it was difficult to know what he did or did not understand. His problem with English, however, probably less severe than I had with the Korean language. The extraordinary success that the small country of Korea has had in industrialization and world trade in the 1980s would support the view that the Korea Institute of Science and Technology has played a very positive role in this achievement.

One of the difficulties that we encountered concerned the nebulous future of the presidential initiative on networks for knowledge. First, there was no way of knowing just how the President felt about a major effort that would call for the establishment of a support organization and the provision of funds. Although Dr. Donald F. Hornig was drafted to chair the interagency group studying the concept and its implementation, it is doubtful that he was informed by Douglas Cater and other intimate staffers of the President about the total commitment that was to be made. In the absence of clear and unequivocal knowledge, it was my view that the OST staff should continue to seek progress on the project. Apparently this was the view of Dr. Nicholas Golovin, OST staff, and the reason that he had prepared his views reported earlier in this chapter. It was also the reason why I prepared two memoranda. The first of these was an effort to open a discussion on a budget.¹ A few of my preliminary remarks in the memorandum are summarized:

There is no way to apply logic or systems analysis in assembling cost data to fix a frame around the nebulosity that we describe as Networks for knowledge. At best, we can try to capture some of the costs of perceivable elements of the NFK system, adding to them as a clearer picture becomes visible....The difficulty is compounded by the very formative period we are in relating to mechanized information systems now beginning to abound around us. While the marketplace has some voice in the process, there are other factors which seemingly "outshout" the economics in at least the feasibility stages. There is still a lack of user demand for new and different systems over those that now exist. There is also another problem. Up to now, the accent has been on the growth of scientific and technical information systems. Educational systems are just getting off the ground. The accent is on aerospace, nuclear energy, and biomedicine systems and the like, hardly anything for behavioral scientists or multidisciplinary areas, but we are moving towards chemical and physical uni-discipline systems. Without a clearer understanding of priorities, it is hard to estimate funding needs of the broader concept of networks for knowledge. The cost of mechanized information networks is bound to increase in the future, and it is doubtful that imposition of user charges will be sufficient. Nor do we have any idea about the amount of centralization that will be needed for the system. Funds and other resources would be needed just to make more accurate estimates.

It was then suggested that for FY 1969, \$1 million be set aside for preparing the

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Dollars and Sense for Networks for Knowledge, August 19, 1968, pp 4.

first part of the plan. For FY 1970, about \$2 million should be requested. The funds would be used for hiring of staff and consultants to work on several studies. To implement the plan, the recommendations asked for \$2 million in FY 1970, \$5 million for FY 1971, and for \$10 million in FY 1972. The specifics were also spelled out in the memorandum on just what the money would buy.

A second paper was submitted to Dr. Hornig, which contained suggestions for possible inclusion in his committee report on networks for knowledge.¹ It called for the preparation of a five-year plan by a group assembled by OST, a plan that would cover all phases the program. The plan would require the Federal agencies to develop certain segments of the plan by December 1, 1968. On that date, the National Science Foundation would submit supporting plans covering professional society systems already receiving some NSF support. The Office of Education would also prepared a segment of the plan for educational programs. OST, NSF and DHEW, working together would prepare a paper on the international aspects of the overall plan. The Agency for International Development would be called on to prepare a phased plan to cover the developing nation portion of the overall plan. Also recommended was the formation of a 10-person staff, with administrative support. Four persons would be assigned to OST and six to NSF. The project staff would assemble all of the previously mentioned plans and prepare a five-year plan, list of priority tasks, responsible organizations to undertake the tasks, a financial plan, and recommended directives and legislation required. To the best of my recollection, there was no response to these two memoranda to Dr. Hornig, which sowed the seed in my mind that the project was in danger, not because of Dr. Hornig's decreased interest, but because of the flow of information from the President's staff indicated a lessening of resolve. Perhaps, the sobering reason was the recognition that obtaining staff resources was not in the cards.

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director OST, Subject: Networks for Knowledge, August 19, 1968, pp 3.

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A considerable part of the time of the OST STI staff was spent in watching and participating in international information activities. During the last week of August 1968, a meeting was held on the peaceful uses of outer space in Vienna.¹ At the meeting, a Canadian delegation urged the United Nations to consider creating an organization to manage the international sharing of data from satellites used in studies of the earth's resources. Said a Canadian spokesman:

Considering the very large cost of fabricating and launching a resource satellite, it would be absurd for nations to obtain the data only over their own territories and throw away the information for the rest of the world... Only the United States and the Soviet Union are developing satellites to make observations in agriculture, forestry, air pollution, wildlife ecology, geology, geography, hydrology and oceanography.

In his comment to Hornig on this subject, Aines wrote:

The point being made by the Canadians is a good one, but it is my suspicion that if the Canadians (and other countries) were invited to put up the funds to buy the data, they would be hesitant, perhaps not.

Aines stated that he would ask the Vette Ad Hoc Task Group on Synoptic Data to discuss the problem, which he considered to be complex one that ^{also} might be ~~studied~~ by the Networks for Knowledge task force. It was indicative of the kind of new issues that the establishment of mechanized information systems operating on a large scale would create. On another note, it had been my feeling up to this time that there was a warm and symbiotic relationship between the United States and Canada that involved considerable information interchange in military and other areas. I had supposed that satellite data also was being shared with the Canadians. The Americans, during this period, felt that the Canadians were not generating enough technical and military data to expect a quid pro quo sharing, but Canada was a friend and an ally, hence the United States needed to be generous. Nevertheless, there was some disappointment on my part that at least some Canadians expressed their ^{anxiety} that equated the United States with the Soviet Union in effect. I was to see more of this behavior in future

¹ Andrew A. Aines, OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Activity Review, September 1, 1968, pp 6.

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years.

During this time frame, the President sent a letter to the Secretary of HUD, dealing with information.¹ He wrote:

Several months ago, I asked the Director of OST to focus on this question: Is the United States making effective use of the experience of other modern nations in the design, construction and procurement of housing? The study has concluded that we can--and should--do much better in sharing our knowledge and in drawing upon the experience of other nations in the field of housing construction and technology. The pooling of knowledge and the exchange of ideas can have these important effects for our Nation. It can result in more efficient and less expensive construction; develop and identify additional export markets; hasten the advancement in technology of the U.S. building industry; and improve the flow of basic and innovative information to universities that are training the next generation of city planners, engineers, and designers.... I am therefore directing you to take every necessary step to promote the exchange of information and housing technology with other nations. I have asked the Secretary of State to assist you in every possible way.

The OST STI staff was delighted to see the letter, which appeared in the Weekly Compilation of Presidential Documents, but we did not have buoyant hopes that much would be done by HUD authorities, largely because this agency did not support a vigorous scientific and technical information program during the 1968 period, nor since.

Another Federal agency, the Department of State, should have been much more deeply involved with international STI matters beyond the flow of reports from science attaches and other U.S. personnel abroad. It was logical then as now for the State Department to have competent STI experts on its payroll, but it was difficult to create an office for this purpose for reasons best known to that agency. Most of the leading countries were much more diligent than the U.S. in this respect. As seen by a writer in International Science Notes (August 1968, page 9), "We believe European countries could and should offer better cooperation in this area (sparse reverse flow of information and data from Europe to the U.S.), where they have the information to make this exchange more of a two-way street..." The writer would have been wiser if he pointed out that what was really needed was a much stronger "pull" mechanism.

¹ Johnson, Lyndon B, President, Letter to Robert C. Weaver, Secretary of Housing and Urban Development, Subject: International Exchange of Housing Information and Technology, August 9, 1968, 1 page.

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Expecting other countries to cooperate with an increased flow of STI was unrealistic. The key to success was to make sure that each agency that transfers STI to countries abroad was taking every possible measure to extract the knowledge, also for the Department of State to stimulate such action at the highest level of foreign countries. At the State Department the priority for STI interchange policy was rather low in the 1960s. Currently, it appears that this is still the case, although more interest has been shown in the negative aspects of transborder data flow on the part of William Salmon and others, who participated in OECD and Council of Europe programs in the transborder data flow area. Some of the State Department personnel, who showed concern for STI matters, even if the agency priority was low, were William Mills, George Kovach, Oswald H. Ganley, and Maurice Crawford. This, to be sure, is a relative assessment, since none of these officials were assigned to STI matters on a full-time basis.

World politics were certainly in evidence during this period. Kenneth Lowry, Bell Telephone Laboratories information chief, was also the chairman of the International Federation of Documentation (FID), informed the OST office that the FID meeting that was to take place in Moscow, September 1986, had been cancelled. This was after the Soviets had invaded Czechoslovakia earlier. Lowry polled 18 countries about attendance at the Moscow meeting. Only Poland and Hungary wanted to attend. Lowry asked Moscow for guarantees that it would provide visas for all attendees. The Soviets refused to issue one for Israel; the decision was that of the Politbureau rather than the Soviet information officials. In another discussion with Robert King, IBM's representative to the Federal community in Washington, D.C., he stated that he had helped evacuate about 20 IBM technicians from Czechoslovakia during the invasion, but several IBM 360s had to be left behind. Undoubtedly, the Soviets "captured" the IBM 360s from the Czechs. Obviously, the "hemorrhaging" of U.S. technical know-how (Bobby Inman) started in 1968 or sooner. Lowry subsequently reported that the Soviets were angry because the FID meeting had been cancelled. But it should be remembered that 70 percent of all documents generated in the USSR remain unpublished. This statistic is unconfirmed, however.

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On June 15, 1968, Associate Editor Bernard F. Kamins, International Electronic and Aerospace Report, sent letters to presidential candidates, posing five questions.

The first of these dealt with STI: Should our government strive to formulate programs for more exchange of scientific information throughout the world? Humphrey answered:

We should do everything possible within the limits of national security to make our scientific advances available abroad. The flow of scientific information is not, however, impeded as much as many seem to believe. It flows much more freely than do manufactured goods, for example, which are hindered by trade barriers. The most formidable barriers against greater sharing of scientific knowledge are a combination of the lack of initiative by some, lack of funds for investment by others, and necessary short-run attention to the bare necessities of life by many. I do believe the United States should step up its efforts to export a carefully planned mix of technological advances and the means to exploit them, particularly to countries which receive American economic assistance.

Vice-President Humphrey was consistent in his longtime view that the freer the flow of STI the better the chance of better international accord, but being a practical person, he recognized the need for protection of information dealing with security matters. He favored the view that the United States should assist developing nations with positive actions in the export of STI, especially to friendly developing countries. He was one of the very few national leaders who recognized the value of STI in the international balance of power.

Recognizing that it was not contributing to the formulation of international STI policy, the Department of State prepared a position paper in connection with the exchange of unclassified information with unrecognized countries such as Communist China and Cuba to be presented to the FCST International Committee. After the draft paper was prepared, a representative of Herman Pollack's office at the State Department, decided to discuss the document with COSATI representatives. Up to this point, only COSATI had undertaken initiatives of this kind, but actions were taken only after consultation with Department of State representatives. The COSATI leadership felt that the timing of the the State Department initiative was not particularly well timed. John Wilpers, CIA, was the source of information that the trickle of publications from

¹ Humphrey, Hubert H, Vice-President, Vice President Humphrey Answers Five Questions, International Electronic and Aerospace Report, July/August 1968, 1 page.

Mainland China was now at a standstill. Wilpers stated that the recent Chinese revolution had brought one interesting result -- Chinese scientists had decided against writing scientific papers. Much of what appeared in Chinese scientific journals during this period were songs of praise for Mao, rather than scholarly studies, "If this was true," Aines wrote to Hornig, "what we have here is the reverse of the traditional 'publish or perish'; in China it was 'publish and perish.'" ¹

In the same memorandum to Dr. Hornig, Aines reported on the publication of a BOB catalog identifying every type of Federal program, domestic and foreign, and who is eligible to get it. The publication was designed to improve communication between the Federal state, local governments and the public. Aines wrote:

It will contain information about grants, loans, loan guarantees, shared revenues, direct construction, provision of Federal facilities, goods and services, donation and availability of surplus property, facilities and equipment, technical assistance or counseling, and statistical or other informational services. I doubt that STI, per se, is included, but time and events are forcing BOB to get into the information game, aside from statistics, and the people in BOB will have to create better information nets to obtain the data.

Earlier in the year, a BOB-established committee, the Intergovernmental Task Force on Information Systems, made up of information experts from BOB, cities, counties and states, produced a valuable publication, the Dynamics of Information Flow. ² The report notes certain barriers to the development of the efficient flow of useful information: lack of strong, central coordination at all governmental levels over the development and operation of internal systems; fragmentation of Federal grant-in-aid programs available to assist State and local governments in the development and operation of information systems; lack of adequate coordination among separate Federal and state programs requiring socioeconomic data; and others. Some of the recommendations made by the Task Group call for: coordinated development of an information system within each government; enactment of a proposed Joint Funding Simplification Act; provision of information systems for the President, Governors, Chief Executives of local

¹ Aines, Andrew A. OST, Memorandum to Dr. Donald F. Hornig, Director OST, Subject: The Weekly Account, September 14, 1968, pp 7.

² Kennedy, John A., chairman and others, Intergovernmental Task Force on Information Systems, Report on The Dynamics of Information Flow, April 1968, pp 31. The

governments to facilitate efficient decision-making; organization of active consultation between governmental groups in the development of intergovernmental information systems in major functional areas such as crime, employment security, health and education; development of a standard package of socioeconomic data as a base for Federal agencies in obtaining data from states and local governments; creation of a State-Local Information Advisory Council; also a Local Information Advisory Council within each state; and others.

In response to the study, BOB prepared a draft circular to the heads of Federal agencies, detailing what it expected of them to implement the program recommended by the Intergovernmental Task Force on Information Systems. It is worth pointing out that during the mid- and late 1960s, there was considerable concern about the rapid growth of information systems and information needs in the Executive Branch. As joint Federal and State programs began to grow, the requirement for information and data also grew. What information and data needed to be shared to bring more efficiency and economy into the process received considerable attention in Congress and the Executive Branch. BOB was sensitive in those days, to the need for overt actions consonant with its responsibility in the Federal management scheme. If BOB had organized a permanent information planning group in the 1960s, it is probable that considerably more progress in information resource management would have taken place over the years. Unfortunately, this did not happen, hence progress was slow and spastic into the late 1970s. This was one reason that OST did not make as much progress in R&D-based information processes. From the mid-1960s on, BOB and OMB were somewhat hostile to OST and COSATI's efforts to move forward in the establishment of sound STI programs.

A problem, aside from the lack of information experts in BOB, was how BOB was organized: a strong budget examiners group, but somewhat illiterate about STI, and a weaker management group, whose interests were focused on procurement of computers, standards development, but not on STI. The one redeeming factor involving the budget examiners/^{group} was its willingness to be involved and to listen. Unfortunately, this group lacked information managers and specialists who operated in this area on a full-time

Interaction with professional societies and trade organizations continued to be a high priority effort of OST and COSATI. Representatives of the National Security Industrial Association's information group met with the COSATI Panel on Education and Training to discuss cooperative programs. It was evident that both sectors were encountering a generation gap dealing with the use of communication and information technology. The visiting group was urged to meet also with the COSATI Task Group on Technology Utilization. Another meeting was held with the Board of Directors of the American Chemical Society. The ACS leadership revealed that they were energetically undertaking the development of agreements with groups in foreign countries to extend the Chemical Abstracts Services internationally. They were finding success in Germany and Great Britain. Since NSF was providing considerable assistance to CAS in modernizing its electronic databases, this brought satisfaction to Dr. Burton Adkinson of NSF, who was present at meeting. Dr. Charles Rice of the National Library of Medicine, who headed up that group's toxicological information program, also made a presentation on the developments in his program. The shift of professional societies to information-processing mechanization was also seen in the announcement of the Biosciences Information Service of Biological Abstracts that it would distribute a new, comprehensive, machine-language information service for biology early in 1969. That organization also received financial support from NSF during this period. Yet another meeting was held with professional society groups, this one with Dr. Frank Speight, Executive Director of the Engineers Joint Council, about that organization's effort to create an engineering information system. Speight and his organization were invited to participate at the major Engineering Information Conference that was scheduled in early 1969. Also discussed was Project Lex, a thesaurus program undertaken by the Defense Documentation Center at the request of Walter Carlson, then DOD Director of Technical Information. Carlson was one of the leading persons in the EJC and he thought it would be useful if EJC was brought into the Project Lex program as a partner. Apparently, this was done. Aines reported in a memorandum

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to Hornig: ¹

DOD recently released the report Project Lex. According to an estimate made by Robert Stegmaier (Administrator, Defense Documentation Center), this report was supported by ONR to the tune of about one-half million dollars. Stegmaier tells me that he thinks the effort was a monumental waste of time and money, and besides (the thesaurus) is based on old 1966 data. He was hopeful that DOD does not expend much money on updating, a chore that his office is being charged with, and one he does not like.

The memorandum goes on to quote Stegmaier who complains that, while he is distributing the Project Lex report to all of the people who need it in DOD, the EJC is putting out the same report with a different cover and selling it for about \$25 a copy. One can sympathize with Stegmaier's lament, but what EJC was doing was far from unusual or unethical. Publishers in the United States had been using government-produced documentation in this manner for decades. The U.S. government does not copyright the knowledge packages that it produces, and, for the most part, this is a wise policy. Stegmaier's complaint about the preparation of Project Lex as "a monumental waste of time and money" is a more serious accusation. It is doubted that there ever was a wide distribution of the document by DDC or by the Engineer's Joint Council. If this is true, then Stegmaier's gripe is more supportable.

Recognizing that OST lacked power compared to BOB in the Executive Office of the President it was always evident to the OST staff that it was mandatory that they work closely with BOB, keeping that agency informed of what was going on in the Federal STI program, obtaining BOB's advice and agreement especially when funds and other resources might be involved. Most of the interaction went on between BOB's budget examiners and OST, but there was always the need to work closely with the BOB management leadership, a group that only incidentally got into the science and technology area. The latter group was led by Walter Haase during the late 1960s. Its interest focused most strongly on computer procurement and computer standards, but it also

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director OST, Subject: The Weekly Account (Project Lex), September 14, 1968, pp 7.

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had some concern for Executive Office of the President general information systems, which were, at that time, very primitive. There was another group in the "management" arm of BOB which was responsible for Federal statistics oversight. It did not seem that there was much active coordination in BOB of all of the information programs, nor was there any evidence of BOB objectives, plans and priorities, except, perhaps, in the statistical area, even here there was only a possibility. The lack of a highly competent BOB information focal point made it more difficult for the OST-COSATI staff. Information resource management, as well as coordination of the Federal STI programs, called for deeper understanding and greater staff commitment by BOB, but this was in short supply. There appeared to be hope for a period time, when we learned from other sources that BOB was negotiating with several contractors to undertake a study to improve the manner in which information is collected and processed to support the decision-making needs of Federal program managers in planning, operating and evaluating Federal programs, especially priority programs that cut across agency, appropriation, and intergovernmental lines. Undoubtedly, the experience of BOB in sponsoring the Intergovernmental Task Force on Information Systems, and the involvement of the Director of BOB, Charles J. Zwick, in this study had something to do with this burst of energy. In a memorandum to Hornig, Aines reported: ¹

All agencies are being notified of its importance, as are members of Congress, also to the personal attention being given by Zwick. For your information, BOB's Haase did not discuss this project with OST. BOB does not have to, of course, but they fully expect us to keep them informed about what we are doing. (Lament aside), I am pleased however that BOB is doing this study as I am convinced that modern information systems in all fields are an absolute requirement, probably I am the only one in OST who contends that there is need for a genuine overhaul of our current methods of handling and transmitting knowledge among the agencies. I believe that new information programs will be the only way to detect much of the dry rot that permeates many ongoing (R&D) programs that reduces their effectiveness and efficiency.

My criticism of BOB has a small history dealing with relations with some of the BOB personnel. Most of my dealings were with persons for whom I had the greatest of re-

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, OST Director, Subject: A Report from Room 220 (New BOB Study on Information), September 22, 1968, pp 5.

spect. One of these was William D. Carey, a BOB Deputy Director, who was one of the wisest and articulate men who I met in my long years of government service. Another was Hugh Loweth, a distinguished public servant who specialized in Federal science and technology for many years. Willard Fazar, an information systems specialist, a thoughtful hard-working individual, was also highly respected for his thoughtfulness and his constant efforts to encourage OMB to improve its stewardship of all information programs, including its internal one. During a period of frustration, largely because of difficult interaction with one OMB staff person, I asked for a meeting with Bill Carey and Jack Young, ^{who was} another assistant director, and pleaded with them to provide OST with understanding and assistance. I gave both of them a briefing about what we were doing and wanted to do in our OST and COSATI information programs. The meeting went off well, and I thought that more help to OST would be forthcoming.

On October 2, 1968, Jack Young and Robert Howard, the latter was also a BOB staff person, met with Leon Rosenberg, the study leader for Peat, Marwick and Livingston, the contractors who were making the government-wide project-reporting study for COSATI. It was a private meeting, but Rosenberg, who found himself queried about his own study, felt it ethical to report the meeting to me.¹ The first question asked of Rosenberg was: Is PML employed to build an empire for Colonel Aines? He was also asked if Rosenberg had found anybody in BOB who needed R&D project information. Young tried to get Rosenberg to provide him with the preliminary results of the ^{project-reporting} study ^{he} for OST. Rosenberg said that/evaded providing an answer, but instead asked Jack Young

about his interest in the bank of data involved in the project-reporting area. When PML received more data (from the Federal agencies, he would be more able to complete his report. He said he asked Young what his information needs were to accomplish his mission. The answer was anything but sharp and incisive, according to Rosenberg, it boiled down to dependence on OST (sources) and reliance on a number of catch-as-catch-can sources, such as agencies whose (funds) were being cut. Rosenberg felt that BOB has not thought-through how it would use the data in the project-reporting system, thus making it necessary, to some extent, to be tutorial. Although vexed by a measure of insensitivity, shown by Young, there was some value in the meeting.

¹ Aines, Andrew A., Notes of Rosenberg's Report of Meeting with Jack Young and Robert Howard, both of OMB, October 2, 1968, PP 3.

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according to Rosenberg.

The project-reporting study came up again in a memorandum to Charles V. Kidd, Executive Secretary of the Federal Council for Science and Technology. Dr. Kidd was preparing for an upcoming budget review by BOB later in the month. In this connection, he asked all of the FCST committee chairmen for their input on the subject. Aines responded: ¹

While it is premature to state what recommendations will be made in the PML study report, due at the end of CY 1968, several will be made to support parts of the program approved by FCST in 1967. There may be a recommendation on the future role of the Smithsonian Science Exchange. (If the recommendations are accepted by us), we ought to be prepared to ask BOB to assist us in getting needed resources. Advance information from the PML study team and corroborated in a GAO study in DOD reveals that the agencies involved in R&D programs are not doing an adequate job in internal project-reporting program development and in the interagency sharing of such information.

In addition to the item on project-reporting, Aines also included: support for networks for knowledge programs; consideration of a proposal by the Department of Interior for a National Library for Natural Resources; creation of de jure responsible agents - NASA, AEC, DHEW AND DOA - all of which operate large scale information systems in space, nuclear energy, agriculture and biomedicine; improved internal agency coordination programs; invocation of user charges; data banks; and improved information systems for HUD and DOT. About the last item, Aines wrote:

Among the many problems of new agencies like HUD and DOT is one that cries out for better programs in the handling of STI. I am reminded of a comment by Dr. Zbigniew Brzezinski, who points out that government is conservative in relation to change because it generates essentially post-crisis management institutions. Both agencies should appraise their information needs and practices at the highest agency level so that they can better husband their resources, scarce as they are, to meet current and future problems.

On the subject of data banks, Aines wrote to Kidd:

There are enough indicators to advance the view that we are entering a period --the Era of the Data Banks--and more attention needs to be paid

¹ Aines Andrew A., OST, Memorandum to Dr. Charles V. Kidd, Executive Director, FCST, Subject: Issues for BOB Review, October 10, 1968 pp 3.

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to their genesis, growth, maintenance, and usefulness. Daniel Bell has predicted that we will probably see a national information-utility system, with tens of thousands of terminals in homes and offices hooked into giant central computers providing library and information services, retail ordering and billing services and the like...The point needs to be made to BOB that there is a need to treat the growth of information systems and data banks in a unitary as well as on a case by case basis. Individual budget examiners making solitary decisions without lively discussion in advance with OST in the realm of science and technology is potentially dangerous.

It would be satisfying to say that BOB agreed to take action as recommended, but it would be incorrect to do so.

On the medical information front, OST was informed that Dr. Harrison Brown of NAS had begun to do preliminary planning for a conference in Canada in the medical and health field, described as a minor Pugwash meeting. According to Scott Adams, NLM deputy director, part of the plan was to create of formal committee to prepare the plans for this meeting. One of the hopes of the sponsors was to attract the Communist Chinese government to participate.¹ In discussions with Dr. George Kovach, Department of State, he agreed that NLM should continue to interact with other countries in the development of the internationalized MEDLARS under the general sponsorship of OECD. He also expressed his interest in finding an ultimate solution to the controversy between Holland's Excerpta Medica and the U.S. National Library of Medicine. The most appropriate approach would be to get Dr. Cummings (NLM) and Dr. Vinken (EM) to gether to work out an agreement, but there was little expectation that this would easily happen. There were other organizations interested in biomedical information. (Buffalo)- In mid-September 1968, Aines attended a State University of New York/sponsored Conference on the Use of Computers in Clinical Medicine, The meeting was organized by Dr. E. R. Gabrielli and it had an international flavor. It was very evident during the proceedings ~~that~~ the development of medical information networks had many dimensions and angles. One of the more lively discussions dealt with the protection of

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: A Report from Room 220 - Orientalia, September 22, 1968. pp 5.

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the medical records of individuals. The use of descriptors, searching of files, the problem of compatibility, the creation of a single thesaurus to replace competing ones, and the use of unique individual identifiers - these were problems that needed to be solved. Cognizant of OST's involvement in biomedical information system development, OST was invited by Robert Taylor, IBM, to address the Ninth Medical Symposium on Bio-Medical Communications at the University of Vermont in October 1986. Since I was scheduled to attend an OECD Information Policy Group meeting at that time, the invitation was passed on to Dr. Ivan Bennett, M.D., the deputy director of the Office of Science and Technology. Dr. Bennett was deeply interested in STI matters, especially those that dealt with health and biomedicine. He was always a source of encouragement to the OST staff charged with making progress in the Science communications field.

COSATI panels and task groups continued to pour out studies and products. Jack Grewell, FAA, and his Panel on Operational Techniques and Systems, after working on Guidelines for the Preparation of Technical Reports by the Government and Contractors for two years, completed the difficult task. Hundreds of experts among the Federal agencies and Federal contractors were interviewed in the process. Clearance was received from the Staff Director of the Congressional Joint Committee, a requirement that I always found hard to understand, feeling that the Joint Committee on Printing had written itself into the script on an operational matter that should be left to each individual agency. The new Guideline made possible "reports better prepared for duplication, photocopying and photo-miniaturization, and a new type of title page, which was also usable as a representation of the full document. Flamboyant covers and excessive use of colors in reports were to be sharply curtailed. It has been estimated by the Panel that if the agencies properly use the Guidelines, many millions of dollars would be saved."¹ These savings would

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Weekly Report, October 26, 1968pp 5.

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result from standardization, reduction of the costs of preparing, storing, retrieving, reproducing, and distributing reports, and facilitation of interchange of STI. The Guidelines do not apply to letter reports, manuals, journal article manuscripts, or reprints submitted as technical reports. They were not intended to inhibit creative reporting, but did frown on highly expensive, "odd ball", hard to reproduce reports. The Guidelines are still being used by some of the Federal agencies after all of these years.

There was a problem of obtaining assistance from the Federal agencies that comprised COSATI. Dr. Leonard Karel, who was loaned to OST by NLM, returned to his agency. Dr. Stephen Rossmassler was then in process of preparing to take over the duty of Executive Secretary, COSATI, with residence at OST. Discussions were being held with Dr. Steve Aldrich of CIA about our borrowing Dr. Robert Landau of his staff to assist OST. Ultimately, Bob Landau was made available to OST. The problem for Aines during that period of uncertain assistance was the size of the overall workload, sufficiently great as to stimulate Dr. Hornig, OST Director, to ask for additional spaces for OST STI matters. Discussions were held with the Office of Education about a detail for Dr. Lee Burchinal, who had expressed his interest in joining the OST staff. The discussions broke down and the services of Dr. Burchinal, who was the Office of Education COSATI representative, did not materialize. ¹

Dr. Robert Taylor, the major architect of the ARPANET, one of the supreme achievements of the Advanced Research Projects Agency, Department of Defense, agreed that the NLM biomedical information network, then being structured by Dr. Ruth Davis, Director of the Lister Hill National Center for Biomedical Communications, could be tied in with the rapidly growing ARPANET. ²

¹ Aines, Andrew A., OST. Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Activity Review, Sept. 1, 1968, pp 6.

² Ibid, Item 15, p. 4.

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Writing as the Chairman of the Democratic Policy Committee, Senator Mike Mansfield (D. Okla.) called on BOB to facilitate the collection of information about Federal R&D projects to be provided to the Senate Appropriations Committee.¹ The format to be followed by the Federal agencies in submitting the material was laid out in this letter. The purpose for the request was not cited in the letter, but it was not considered to be for friendly reasons. Senator Mansfield sent a similar letter to John S. Foster, Jr., Director of Defense Research and Development, on the same day, stating that OMB was informed of the request and would coordinate the action throughout the Federal government. Similar letters were sent to other agencies. In my weekly report to Dr. Hornig, I wrote (summarized):²

On October 25, 1968, OMB's Loweth and Schleede visited me, asking if the agency information banks would support the request, adding at Mansfield's request a short statement of objective for each project and a usable index for all inputs. To obtain further detail, I called Senator Mansfield's action officer (Mr. Ferris), who explained that the idea was to get data from all agencies covering R&D in all research fields, relate it to individual universities in each state, and to print out the lot. I told Ferris that he would get 90,000 to 100,000 reports and putting them together would be a monumental and costly project. The product would not be helpful to researchers, who would be interested only in certain fragments of the report of special interest to them. I explained that there was a special study - the Peat, Marwick and Livingston study - now underway. One fruit of the effort would be a better system to respond to requests like that of Sen. Mansfield. Mr. Ferris was pleased to learn about this effort and agreed that if Congress was convinced that better data would be available in the future, Senator Mansfield might withdraw his original request. I asked the PML study head to meet with Ferris immediately, which he did with a BOB representative. Loweth called me and stated his view that OST's effort on the overall Federal research project problem was on the right track.

A week later, Representative Glenard P. Lipscomb of California communicated with DOD about his concern that too much valuable military technology is being discussed in journals and being made available in reports disseminated by the Federal Clearing-

¹ Mansfield, Mike, Senator from Oklahoma, Democratic Policy Committee, Letter to Phillip S. Hughes, Deputy Director, Bureau of the Budget, Washington, D.C., October 17, 1968, pp 2.

² Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Weekly Review (Item Number 1, Mansfield and Agency Data), October 26, 1968, pp 4.

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house for Scientific and Technical Information. Aines wrote about this current crossing the effort of Senator Mansfield as follows (summarized):¹

Lipscomb does not think that the public release policies and security classification criteria are adequate. He applauds the decision of the Chief of Naval Operations, who on April 18, 1968, prohibited open publication of technical information of potential intelligence value. He concurs with Admiral Hyman Rickover who expressed the view that DOD ought to do it across-the-board in testimony before the House Defense Appropriations Subcommittee on May 1, 1968. On October 14, 1968, Senator George Mahon asked Secretary of Defense Clifford, if he intended to apply this DOD-wide. On October 22, 1968, John Foster replied to the Lipscomb letter, stating that a DOD re-appraisal was being undertaken but pointing out that the situation was not necessarily out of hand.

Aines also pointed out that the above information had come to him from a source other than the DOD COSATI representative. He found this disturbing, writing to Hornig:

I consider this evidence of the continued decline of DOD's supervision and coordination of the agency's STI program...I believe that something should be done to "encourage" Foster to fill the STI job left vacant by Walter Carlson's departure about two years ago...It seems to me that Foster's procedure in regard to the congressional requests is logical.

Many years have passed since Mansfield requested a "truckload" of reports from the Federal agencies. It would be delightful to write that if such a request was submitted to OMB and the Federal R&D agencies today, the current information systems would make it easy to provide all the information requested rapidly. Unfortunately, this is not the case. What has crystallized in recent years is the thrust made by Congressman Glenard P. Lipscomb to curtail the flow of U.S. military-related technical information.

In today's Washington, D.C. climate, it would be hard to explain to the current crop of STI managers and policymakers what was being done in the STI field by OST and COSATI. An example of what went on during a typical OST week is summarized below.² The first item deals with an attempt to help the publisher of International Science and Technology find a new source of funds in the private sector. It was made clear

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: The Week in Retrospect, November 2, 1968, pp 4.

² Aines, Andrew A., OST, Memorandum to Dr. Doand F. Hornig, Director, OST, Subject: Weekly Report, November 9, 1968, pp 3 (with attachments).

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that OST was not in the position to help the distressed publication, so the publisher was advised to meet with officials of the American Business Press Association in Washington, D.C. who might have ideas on the subject. It was explained that NSF support was only available to professional societies and other non-profit organization. The second item describes a call from Stanley Gordon, Ford Foundation, who had received a request for funds from Dr. Harrison Brown, Foreign Secretary of the National Academy of Sciences, to support a person working on the ICSU-UNESCO "global STI System" for two years. Dr. Gordon was told that while OST stood behind programs to help improve worldwide information exchange, it had no views on the proposal, lacking information about what the money would be used for. The third item dealt with ICSU-Abstracting Board agreements to work on an international word abbreviation list, which was regarded as a worth-while project. It was largely information, requiring no action by OST or COSATI. The next entry involved meetings held with representatives of BOB and the Department of Interior, the latter group in search of authority and funds to establish a National Natural Resources Information Service Network. OST was sympathetic, but felt that what was being asked for was a new agency-wide library in function, but lacking details of what would be done, if anything, about the various bureau and other libraries that were scattered around the agency. We advised caution on this proposal until this information was provided BOB. The next item described a meeting of about 35 Federal agency representatives to discuss their project-reporting programs with the PML study team. Noteworthy was the hostility and defensiveness of some of the representatives. It was evident that most of the agency STI managers were not involved with agency project-reporting programs - there was a different cast of characters involved in that play - and the managers of project-reporting activities knew little about the thrust of FCST to improve science communications within and between the agencies. After listening to some of the agency representatives, it was easy to conclude that the actual exchange of R&D project data with other agencies - and within some agencies - was a sometimes thing. One item written about in the weekly report dealt with a meeting

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held with Bob Howard and Phil Shambora, both of BOB, on the NLM budget of FY 1969.

I wrote:

I told them that the request had my support, that a biomedical information system of quality was being built by NLM, that it had many dimensions - service to the needs of practitioners, researchers, schools, students, and administrators, that OST had made a major study on the subject, that there are valuable national and international aspects of the program, and that congressional leaders were strongly supportive of the program. I told Howard and Shambora that U.S. biomedical research programs were getting nearly \$2.5 billion in 1968, about \$1.6 billion from Washington sources.

Shambora, who was the budget examiner for health programs, found the program and the support of OST persuasive and most of the funds requested were subsequently provided.

The next item reported on a meeting of Aines and Landau of OST and Oettinger and House of the National Academy of Sciences. Landau demonstrated the experimental use of the COSATI Information Science Technology research project database that was then located at the Mead Data Center in Dayton, Ohio. Oettinger talked about his new computer panel that was then being assembled.

The value of the weekly reports to Dr. Hornig was to keep him well informed about what was going on in his STI program and to solicit his comments and questions, thus providing us with valuable guidance. These reports were in addition to/weekly ^{scheduled} meetings of the OST staff. The leaders of the various OST programs were expected to make presentations that would include information of a general nature of probable interest to all members of the OST staff. In addition, there were many special meetings held on a one-on-one basis with Dr. Hornig, who proved over and over again his ability as a leader and a manager. His interest in STI matters and issues never flagged as long as he was the Director of OST.

A sign of the vigor of the program during this period is evidenced in the continuing interest of the press in what COSATI and OST were trying to accomplish. One writer reported that the issue was no less than bringing order out of chaos in the data retrieval area. ¹

¹ Scientific Research (November 11, 1968), author unnamed, Data Retrieval: Order Out of Chaos, p. 19.

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Excerpts of the article follow:

Science officials of the Johnson Administration are working at top speed to formulate concrete proposals for the next Administration on how to bring order out of the chaos currently faced by those trying to make the many scientific information storage and retrieval systems compatible with one another. COSATI, which is leading the way, has called a meeting of industry, university and government information specialists for later this month to hammer out the general lines of such proposals. COSATI has already compiled a report on a number of the government computer-based information systems, and hopes to get agreement on how to dovetail all existing data systems and achieve machine compatibility.

The article then describes the efforts of Chalmers W. Sherwin, the Commerce Department's former deputy assistant secretary for science and technology and an outspoken advocate of machine compatibility. His study, started a year earlier at the request of OST, misfired according to the article, one reason being the failure of the report to follow the terms of reference set for the task group. The writer added:

A lot of valuable things were in the Sherwin report, but it just didn't answer the questions that were asked...It was a worship of the status quo, said one well informed source, which didn't suit us as a way to go in seeking compatibility of information systems. Sherwin...ran into obstacles raised by information retrieval experts at private companies, federal agencies and professional societies, each of whom was dedicated to preserving his own approach on the subject...

In a related move, COSATI's Task Group on National Systems for Scientific and Technical Information...has invited three nongovernment experts to join it as "observer-consultants." They are Milton Harris, board chairman of the American Chemical Society, William Koch, director of the American Institute of Physics, and Jordan Baruch, president of the Interuniversity Communications Council (EDUCOM).

As happens when one Administration is about to give way to a new one voted into power, each of the FCST chairmen was invited to provide a ^{brief} statement of issues to FCST's executive director.¹ The request was responded to by the chairman, COSATI, long these lines:² (excerpts)

COSATI's effectiveness would be enhanced by: increased interest of agency members of FCST in the performance of COSATI members and discussions between the FCST member and the chairman of COSATI about the perceived performance of each COSATI member; additionally, there should be a FCST program to monitor the agreements made by the federal agencies.

¹ Kidd, Charles V, Executive Secretary, Federal Council for Science and Technology, to chairmen of FCST committees, Subject: Transition Issues -- FCST., November 8, 1968, 1 page.

² Aines, Andrew A., OST, Memorandum to Charles V. Kidd, Executive Secretary, FCST, Subject: Transition Issues - COSATI. November 11, 1968. pp 2.

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A number of other suggestions were made which were, in general, aimed at improving the performance of FCST and to compensate for its lack of authority to "direct" actions. FCST operated on the basis of agreements made by its members to follow out a course of action that they voted for. One problem was the changing of FCST members with the passage of time, which resulted in less resolution on the part of individual agencies to continue individual agreements. In defense of the system, it should be pointed out, there were many positive accomplishments which far outweighed the problems resulting from personnel changes and the passage of time.

One of the issues that caused a flurry of excitement and worry on the part of scientific societies dealt with the economics of publishing of learned journals. Costs were rising much quicker than the ability of professional societies to finance them. At an earlier time, the agencies had agreed to the "page charge covenant" - a device to assist each of the publishing societies. The problem encountered during this period was the unwillingness of some research performers to provide page charges to the societies voluntarily. Several meetings were held with the professional societies to plumb the extent of the problem and how the Federal government could help. Ultimately, the matter was discussed by FCST, which issued a statement, which repeated its philosophy and the agreements of the members.¹

The publication of research results is an essential part of the research process. This has been recognized in part through authorization to pay publications costs from Federal research grant and contract funds. It is the intention of the Federal Government when making research grants or contracts that costs of such publication (including page charges) should continue to be borne from the grant or the contract, if other sources are not available.

Hornig also said: "I expect that each Federal agency will take steps to inform the staff and contract officers that this represents the position of their agency. Whenever they are in the position to do so, they should encourage performers to pay the page charges."

¹ Hornig, Donald F., Chairman, FCST, memorandum to FCST members, Subject: Payment of Publication Costs from Federal Research Grant and Contract Funds, November 13, 1968, 1 page.

With this maneuver, the problem for the professional societies diminished. Expressions of appreciation flowed into OST for its support.

The need to protect the results of Federal research and development projects was a matter of concern during the late 1960s.¹ Senator George Mahon put his views directly to Secretary of Defense Clark Clifford and separately, Congressman Glenard Lipscomb made his views known directly to the President. Mahon was worried about the release of valuable U.S. military technology in open publications. Lipscomb, who had also written to DOD about his views, advocated an Executive Order enabling the Executive Branch to withhold from open publication such unclassified military technology as may require protection in the interest of national defense. John Foster answered one of the letters from Congress, Clifford the other. The current DOD security system was described, citing its advantages, but then it was agreed that DOD would review its procedures. DOD's General Counsel, Solis Horowitz, sent a letter to all DOD components on November 5, 1968, stating that his office was designated to re-evaluate DOD's procedures and directives relating to the safeguarding of security information. DOD appointed Captain Shugart, USN, to prepare a draft plan on the subject. Aines discussed the matter with Shugart, pointing out that:

OST had an interest in the outcome of DOD's findings and while OST favored necessary safeguards, we did not desire to see a change that would seriously inhibit the flow of unclassified data and reports, we did not favor a change that would seriously inhibit the flow of unclassified information. (Shugart) talked about shifting from a statement of "no foreign" distribution to the employment of the "For Official Use Only," claiming that this would be a more liberal approach. With Shugart's agreement, I asked Colonel Currie Downie, Office of Aerospace Research and Chairman of the COSATI Task Group on the Dissemination of Scientific and Technical Information to interact with him.

Aines also advised Sr. Hornig:

At your next meeting with DOD, you might want to ask Dr. Foster, the Director of Defense Research and Engineering, about the status of the re-appraisal and to let him know of your interest in holding the line.

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: DOD and Congress Look at the Dissemination of Unclassified STI, Dec. 5, 1968,

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Two decades later, it was the Executive Office of the President, rather than Congress, that became upset about the "hemorrhaging of U.S. technical know-how." It is dubious if the 1968 episode was remembered by any of the current DOD authorities.

As a result of the interplay between Congress and DOD, it was decided to resume agency STI program reviews, starting with DOD's Defense Documentation Center. To facilitate the free interchange of information, it was decided that only the COSATI Chairman and Executive Secretary would be present at these reviews. On another matter involving DDC, it was discovered that this agency was contemplating a contract study on research project report use. Whereupon, it was suggested to Howard Lawson, DDC, that he contact Peat, Marwick and Livingston to avoid work in this field already done by PML on another contract. It was also suggested to Lawson that he contact Wally Haase, BOB, to make sure that the McKinzie study, sponsored by BOB, does not cover the same ground.¹

Other matters covered in the December 7, 1968 Weekly Report to Dr. Hornig included:

Recommendations to OECD that Dr. Lewis Branscomb and Melvin Day be invited as U.S. representatives to participate in a general survey (Branscomb) and a compatibility study (Day), both involving STI.

A request for NIH magnetic tape files covering lists of agency grants was made to that agency by Eugene Garfield, ISI. A printed version was provided, but this did not satisfy Garfield, who offered to pay a nominal fee for the preparation of the tape. Unfortunately, the current tape contained confidential information and it would be costly to sanitize it. NIH was advised by OST that if there were enough requests for the grants file on tape, it ought to consider making it available as a public and useful service.

The Clearinghouse for Federal STI had agreed to publish and distribute the recently completed COSATI Guidelines to Format Standards for Scientific and Technical Reports Prepared By or For the Federal Government. (It is not known if the Federal R&D agencies still adhere to the use of this format. The standard was not only useful for individual reports, but it also provided a new technical report standard title page, which was an excellent device for interchange purposes electronically.)

The experimental Federal Information Research in Science and Technology (FIRST) System, which includes information science technology project reports of the Federal agencies, has been demonstrated to several government

¹ Aines, Andrew A., OST, Memorandum to Dr. Donald F. Hornig, Director, OST, Subject: Weekly Report, December 7, 1968, pp 3.

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agencies, who were invited to participate in the use of the file during the first half of 1969 via the use of remote consoles. The system was also demonstrated to Dr. Anthony Oettinger and Donald Madden of ACM. Madden has agreed to make material from Computing Reviews available to the file.

It should be mentioned that the FIRST file was a unique, original and demonstrative of the leadership of the COSATI community. On a continuing confrontation:

At our request, Dr. Martin Cummings has written a letter to Dr. Vinken, Excerpta Medica, inviting him to visit the United States to discuss ways of improving their biomedical information programs. I have written to Dr. Winter of the Dutch government suggesting that he ask Vinken to contact Dr. Cummings as soon as possible to set a specific date. (OST was pleased that Dr. Cummings offered an olive branch to Dr. Vinken, but we had no confidence that it would be accepted.)

On information-sharing between professional societies and OST:

Dr. Milton Harris, President of the American Chemical Society, called to express his pleasure that a scientist of the calibre of Dr. Lee A. Du Bridge was to be Dr. Hornig's successor. Reporting on international activities, there is a proposal by some German groups that ACS join them in "carving up the world" in the chemical information field. We both agreed that the United States should avoid involvement in "cartelization."

Robert Saltzstein, Counsel for the American Business Press, Incorporated, telephoned to express his organization's appreciation for the cooperation given it by OST and COSATI. OST had suggested to NSF that it consider appointing a member of this group to a panel it had formed.

During the late 1960s, it was evident that the growth of technical publications, resulting from government-sponsored research and development, was a potential threat to the viability of professional society publications. In addition, there was frequent criticism of the quality of Federal technical publications that were making inroads on total scientific and technical publishing in the United States and elsewhere. For these reasons, COSATI agreed to undertake a study of current Federal publication of technical reports to assess damage, if any, or future threats, if evident. A COSATI panel, the Task Group on the Role of the Technical Report, was formed, under the chairmanship of Dr. Sidney Passman, who at that time was assigned to the U.S. Arms Control and Disarmament Agency. Previously, Passman was a member of the NSF staff and the author of a book on science communications. Other members of the panel were: Edmund Dews (The Rand Corporation), Dwight E. Gray (American Institute of Physics), John Howard (Air Force Cambridge Research

Laboratories, Klaus G. Liebhold (TEMPO, G.E. Co.), John Murdock (Battelle Memorial Institute), Shirleigh Silverman (National Bureau of Standards) and William Wolfe (Honeywell Radiation Center).

After extensive study, a report was prepared - The Role of the Technical Report in Scientific and Technological Communication.¹ The specific charges to the panel were to: appraise the role of the technical report in scientific-engineering communication; recommend methods of improving its quality and usefulness; rationalize its interfaces with other media for communication such as professional society, etc.; and to enhance the Government-sponsor technical agent contractual relationship. These questions were to be answered from a broad economic, social and behavioral point of view. It should be recorded that there was considerable debate and dissension in the panel's work, much of it the result of the clash between conventional and Unconventional (unrefereed) approaches in publishing. Two evident solutions were explored. The first of these was to explicitly acknowledge the professional scientific journal literature as the preferred medium for the transmission of all types of STI. Technical report literature would be reduced to the bare minimum needed to manage the government R&D programs. A considerable amount of subsidization to expedite the handling of government technical reports would be needed for the science publishing community. The journal review process would have to be adapted to include government technical reports without doing damage to the more traditional scientific and technical articles. The other "solution" would acknowledge the technical report literature as the principal and preferred medium for detailed technical communication. Some technical reports, dealing with basic research, would be diverted to the professional journals to be treated in the traditional way; refereeing, etc.

¹ Passman, Sidney (Chairman), et al, The Role of the Technical Report on Scientific and Technological Communication, Task Group on the Role of the Technical Report, COSATI, FCST, Washington, D.C., December 1968, pp 108.

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The panel concluded that neither extreme solutions was viable and that co-existence of both approaches was required. Overlaps should be held to a minimum. The journals should continue to turn out their products as before, but the government should consider more contributions and volunteer support of the journal programs by government employees. The government should insist that technical reports prepared under contract be of high quality and properly reviewed. The initial and secondary dissemination of reports should be conscientiously undertaken. In effect, the panel came down on the side of maintaining the "status quo" as the most viable approach. Little consideration appeared to be given to the growth of electronic information exchange and dissemination in the report, a development that was well on its way, and one that might have an impact in the future.